

CACTUS AND SUCCULENT JOURNAL

VOL. XXXII

JAN.-FEB., 1960

No. 1



FIG. 1. *Lobivia bertrichiana*
Photo by Marjorie Shields, New Zealand.
See Flowers Under Glass



CACTUS AND SUCCULENT JOURNAL

Published and owned by the Cactus and Succulent Society of America, Inc., 132 W. Union St., Pasadena, Calif. A magazine to promote the Society and devoted to Cacti and Succulents for the dissemination of knowledge and the recording of hitherto unpublished data in order that the culture and study of these particular plants may attain the popularity which is justly theirs. North and South America \$4.00 per year; foreign \$4.00 by money order. Mail application to SCOTT HASELTON, Editor, 132 West Union Street, Pasadena, California. Editorial Staff: THE ENTIRE SOCIETY. Entered as second Class Matter at Pasadena, Calif., under act of March 3, 1879. Published bi-monthly. We reserve the right to accept or reject advertising or articles sent to this JOURNAL.

VOL. XXXII

JANUARY-FEBRUARY, 1960 (Price 75¢)

No. 1

CONTENTS

Desert Flowers Under Glass	Marjorie E. Shields 2
A Revision of <i>Borzacactus</i>	Myron Kimmach 8
Inexpensive Adjustable Greenhouse Shading	Irving G. Reimann 13
Cactus Orphans—A Challenge	Mrs. Cactus Pete 15
Questions and Answers	Harry Johnson 19
Cultivated and Native Agaves in the Southwestern United States	August J. Breitung 20
Spotlight on Round Robins	Gladys H. Panis 24
The New York Cactus and Succulent Society	Joseph Emma 25
Notes on <i>Haworthias</i>	J. R. Brown 26
Epitaph ? to <i>Eopuntia douglasii</i>	Herman F. Becker 28
Cereusly Speaking	John E. C. Rodgers 30
Spine Chats	Ladislaus Cutak 31

CACTUS AND SUCCULENT SOCIETY OF AMERICA, INC.

Names and Addresses of Members of the
Executive Board for 1960

Past President

Dr. Lyman Benson
1430 Via Zurita, Claremont

Junior Past President

Harry Johnson, Sr.
Johnson's Cactus Gardens
Box 458, Paramount

President

Edw. S. (Ted) Taylor
3036 Nebraska, South Gate

Vice-President

Nicholas Bokarica
1496 Cheviotdale Dr., Pasadena

Recording Secretary

Wm. B. Bentley
10608 Poinciana St., Whittier

Treasurer

Dr. Robt. T. Craig
3685 N. Maine Baldwin Park

Editor

Scott E. Haselton
132 W. Union St., Pasadena

Affiliate Corresponding Secretary

Mrs. Murray Skinner
8627 Denver Ave., Los Angeles

Librarian

Orva Bokarica
1496 Cheviotdale Dr., Pasadena

Elected Members of the Board

Waldo Abercrombie
George Glade
Dr. George Lindsay
Dr. Reid Moran
Robert Killian
Sherman Ernest Beahm
Howard F. Snyder
Pat Moorten
Harry Johnson, Jr.
Dr. H. C. Lawson
Don B. Skinner

SILVER ANNIVERSARY MEETING

Plans are underway for a large exhibit of cacti, succulents, and kindred subjects at the Fremont Agricultural Center, 425 East 79th Street, Los Angeles, Calif., in connection with the Silver Anniversary Meeting of the Los Angeles Cactus and Succulent Society, on Sunday, February the 14th, 1960, starting at 2.00 p.m.

There will be special speakers with colored slides shown during the afternoon, and it is hoped that all the friends of this Society will try and be there to help this Affiliate celebrate their twenty-fifth birthday. Many well known figures in cactus circles will be there, including several Past-Presidents of the Cactus and Succulent Society of America, Inc., so here is your chance to see a fine plant exhibit and meet many people you have read about.

Chairman of the day,

EDWARD S. TAYLOR, Charter Member

JOURNAL SUBSCRIBERS

If you receive the Journal you are automatically a member of the Cactus and Succulent Society of America, Inc. If you would like a membership card, please send in your request.

GATES CACTUS, INC.

Wishes to assure the many friends of the late Howard E. Gates that they will receive the same courteous service as during his lifetime. Excellent nursery grown plants are available. Write for Free Illustrated Catalogue.

GATES CACTUS, INC.

2514 Hillside Ave., Norco, Calif.

TEXAS COLLECTION

One each—*Wilcoxia poselgeri*, *Acanthocereus pentagonus*, *Echinocereus fitchii*, *Thelocactus bicolor*, *Lophophora williamsii*, *Coryphantha runyonii*, *Echinocereus enneacanthus*, *Astrophytum asteria*, *Dolichothela sphaerica*, and *Echinocereus pentaloophus*—all blooming size—all for \$5.00—parcel post prepaid—Write for complete list and descriptions.

HELEN'S CACTUS

2205 Mirasol Brownsville, Texas

DESERT FLOWERS UNDER GLASS

The story of my experiences and delight in growing and flowering Cacti and Succulents in a small glasshouse in Christchurch, New Zealand

By MARJORIE E. SHIELDS

CHAPTER 15 LOBIVIAS

We shall now find group after group with myriads of flowers. These are all on the lower portion of the centre bench, and, beginning from the trellis end the first are Lobivias. The name is an anagram, so we have no hesitation in saying they are all found in Bolivia or thereabouts in South America. Here they are making a very gay corner with flowers of every hue—red, ruby, carmine, flame, yellow, cream, purple, lavender, beetroot, and pink. A wonderful assortment of colour to find in any one group of plants. As well as the range of colour in the flowers, there is also variation in size—from little larger than Rebutias to that of the largest Echinopsis. The spine formation may be minute to very long, while the plant shapes vary from the size of golf balls to soccer balls, or single tall columns to clusters of columns. They run the whole gamut of colour, shape and size. They are of easy culture requiring no special treatment and are rarely attacked by mealy bugs, and scale has never been found on them.

Now to attach these many colours, shapes and sizes to the plants and find out their names. We shall take first those with Rebutia-like flowers. This one with so many blossoms is *L. hertrichiana* from Peru, named after Wm. Hertrich, Curator of the Huntington Botanic Gardens. It is a very prolific bloomer, flowering on and off right through summer. The scarlet blooms are larger than even the largest Rebutia. The filaments, of uneven lengths being the same colour as the petals are inconspicuous, so the yellow anthers look as though suspended in space, like tiny stars as they descend in graduated lengths down the throat. The green stigma lobes reach about half way up with stamens both above and below. On most of the plant there are practically no spines, just one or two short ones from odd areoles. Nevertheless the plant is sitting in a nest of long cinnamon spines! Apparently the spines only develop around the base of the plant, so that as it is clustering well and has many blossoms, it is a picture.

Next is *L. binghamiana* also with red flowers $1\frac{1}{2}$ to 2 inches across, with red filaments and yellow anthers. This gay little plant from Peru is not as spectacular as the previous one. It is small, globular, very spiny, about 3 inches across and high, and just beginning to cluster. Another

from Peru is *L. planiceps*, a neat, flattened, dark green, globose plant in a three inch pot, with dark red flowers larger than a large Rebutia. It has bright straw coloured spines shading to brown, with the centrals much longer. In time I think these will be very long as one already measures over $1\frac{1}{2}$ inches. The plant, small yet, shows great promise and the flowers are most attractive.

L. corbula, again from Peru, has pretty little carmine flowers, the outer petals recurved, the inner ones shorter and broader. The name means "a little basket"—full of flowers? How suitable! The cinnamon spines are short now but look as though they would be much longer with age.

It is strange that all these with the red flowers should come from Peru. But here is beautiful *L. backebergii* from Bolivia, with flowers that are not red. Just a small plant, no bigger than a hen's egg, with tiny straw coloured very fine spines, barely visible. It has a complete circle of six gorgeous flowers of a colour that is neither purple, magenta, nor rose-pink, but a mixture of them all. The official colour is given as carmine with a hint of blue, but it is much more beautiful than that. The flowers stand well above the plant on small hairy tubes. The narrow sharply pointed petals shade to cream in the throat; the filaments to match show red against the cream with yellow anthers, with the cream style breaking into feathery stigma lobes.

And the name of this next lovely one with the beetroot coloured flowers? I do not know for certain. True, the label says *L. rossii*, but . . . ! It is not the *L. rossii* of Marshall & Bock, who say the flower is yellow. This plant was grown from Ritter's seed and should be true. But has someone blundered? Whatever its name it is a beautiful Lobivia. In this funnel shaped flower with a wide throat there are two definite groups of stamens—a single row of long ones commencing at the junction of the petals with the wide tube and reaching almost to the petal tips, while the second group has stamens in graduated lengths right down the tube. The plant has a blue-green body, with short radial spines and one very long central all tinged with brown. Judging by the growth it is making it will some day be quite large.

Another beautiful one, unusual in its flower colouring and in its spine formation is *L. perclardiana*. It looks so gay, for it has several

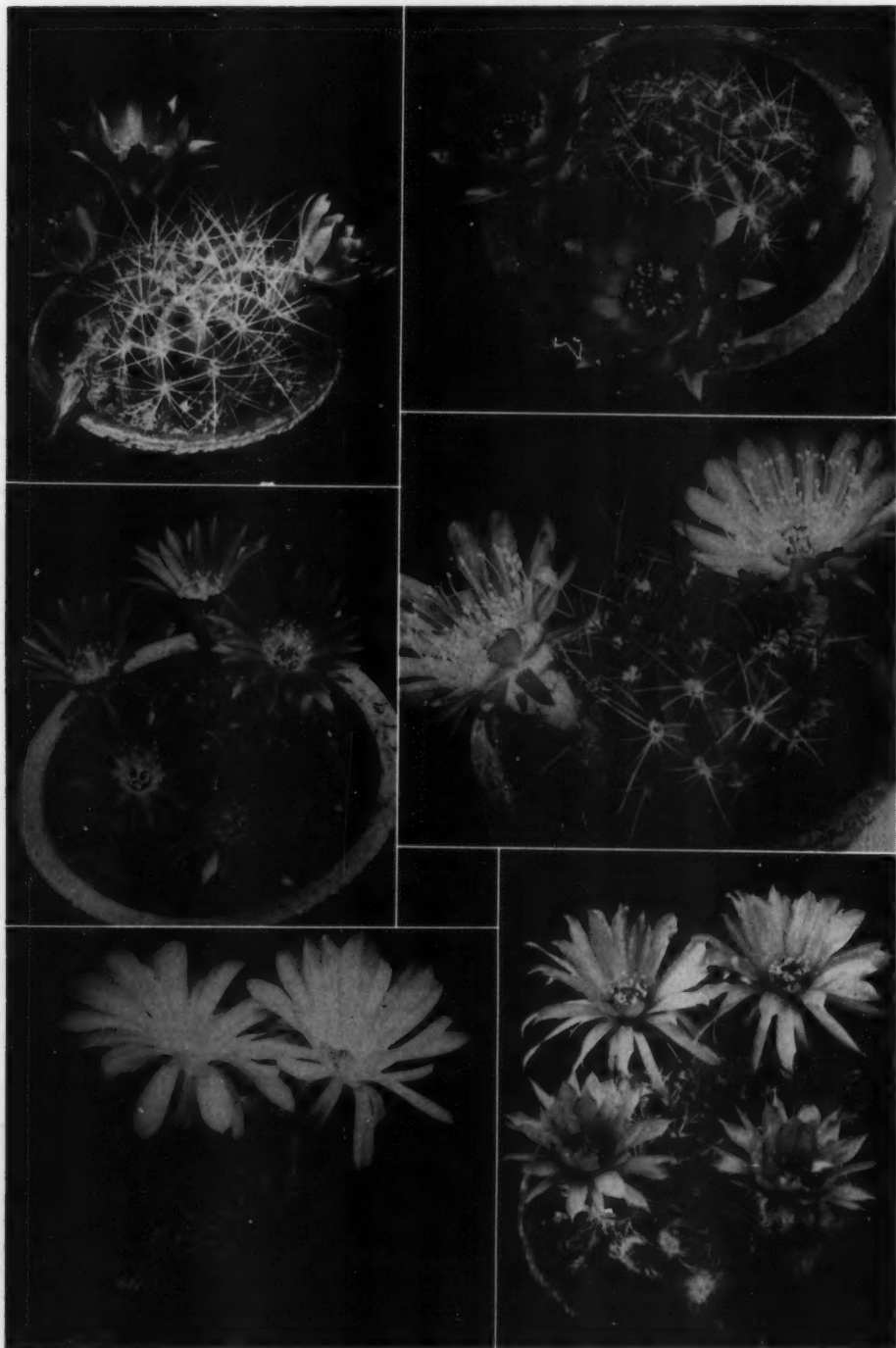


FIG. 2. Top left, *Lobivia binghamiana*. Top right, *L. corbula*. Center left, *L. backebergii*. Center right, *L. rossii*. Lower left, *L. leucomalla*. Bottom right, *L. perclardiana*.

delightful bright purplish blossoms, with golden yellow stamens and pale green stigma lobes deep down in the throat. Look how the little spine clusters stand away from the plant and then recurve so delightfully! They are almost flowers in themselves, being many coloured—cream, pink, red and brown. A beautiful dark green plant, decorative and colourful even without flowers.

A small plant from the Argentine, *L. leucomalla* is quite different from the others, the body being hidden under a veil of fine, white, hair-like radials. With the areoles almost touching, the plant is completely clothed, but short red centrals push their way through the enshrouding radials, giving this plant a beauty all its own. But look at those blossoms! There is nothing small about them, even though the plant and the spines may be. Beautiful pale yellow blooms of $2\frac{1}{2}$ inch long, narrow green tubes. As the tube is narrow, so too is the throat, therefore the style is very fine and breaks into finer stigma lobes. The thread-like yellow stamens reach half way up the clear plastic looking lemon petals. A very lovely flower on a charming, neat little plant. In complete contrast is *L. jajoiana* var. *fleischeriana*, for this one's tube and throat are as wide as *L. leucomalla*'s are narrow and is as robust as the other is frail looking. The shortish green hairy tube is narrow at the base and widens considerably towards the top, where the short, wide, claret coloured petals with a bluish tinge stand in an out-spreading circle around it. Also at this junction is a single row of short, sturdy, very dark claret filaments with yellow anthers, like a circle of stalwart soldiers mounting guard over the heart of the flower. The inner surfaces of the tube, a glorious deep claret, shining as though polished with wax is full of stamens, rising from the base of the throat in graduated lengths up to the ridge where stands the other circle, while deep down at the base of the tube may be seen the stigma lobes. One would naturally conclude that when stamens and stigma lobes are so situated the seed would be self fertile, but it does not necessarily follow, for seed has never set on these plants. As well as having such an exotic flower this plant has also beautiful, long, fine, slightly hooked spines which on the new growth are brilliant red. It is a most colourful and beautiful plant.

Quite a different one is *L. pentlandii* adding a delicate rose pink bloom to the group. Do you notice anything unusual about this flower? No? Well, most petals have a mid rib in a deeper or contrasting colour but these petals have a white one, and the pink deepens towards the edges of the petals giving them the appearance of being outlined in pink. The midrib whitens the base of the petal which then shades to pale green in

the throat, while cream stamens rise above lime-green stigma lobes. A most beautiful flower on a very plain nondescript plant, with spines hardly worth mentioning. (Strange that so lovely a flower should have such a simple background!)

This very large globular one, is another discovery of the Blossfeld Expedition to Bolivia in 1936. The Catalogue number is 22a, and that is the only name I have for it. The red flower on a short green tube is small for the size of the plant and rather disappointing. One would naturally expect something much more spectacular from a plant that size. I wonder could it be an *Eriosyce*? But *L. famatimensis* in front of it is very lovely, with a peculiar spine formation, which makes this one easy to identify. There are many low ribs with areoles so closely set they are almost continuous. The fine short spines lie flat against the body in a comb formation, and as they are horizontal and the ribs so close together the combs interlock. This must be one of the many varieties of this plant, for the typical form has yellow flowers, but this has clear flame blossoms outlined with red. They are three inches across and like others we have seen have the single row of stamens attached to the base of the petals where they join the tube, the rest of them covering the entire surface of the tube in graduated lengths, while well down in the throat are the green stigma lobes. A beautiful flower on a very interesting plant which comes from Famatina in Argentina.

L. longispina, another from Argentina, was found there in rock crevices by J. A. Shafer. The flower looks much too delicate and dainty to have come from such a rugged place. But not so the plant which is very sturdy with long spines and curved tips, some being up to $2\frac{1}{2}$ inches in length, all tending to turn upwards. It looks really ferocious. But the blossom is daintiness itself, with its long, narrow, sharply pointed cream petals, with a touch of bronze on the outer ones and with its numerous stamens so long they almost reach the petal tips, while the pale green style and stigma lobes are deep down in the tube.

The glossy yellow one with the wide, blunt petals is *L. aurea* from Argentina. What a lot of petals it has; three distinct rows surround the paler yellow stamens which all curve inwards over the top of the green style which breaks into cream stigma lobes. This has a more slender tube than some, covered with grey hairs. The plant itself is large, with prominent and acute ribs and long, thick, brownish spines tending towards yellow at the tips. This one with the lilac flower is *L. wegheiana*. Quite rare and found on the highest hills in Bolivia. A really lovely blossom with its lilac petals and green stigma lobes. The plant is very spiny too, with centrals up to 2

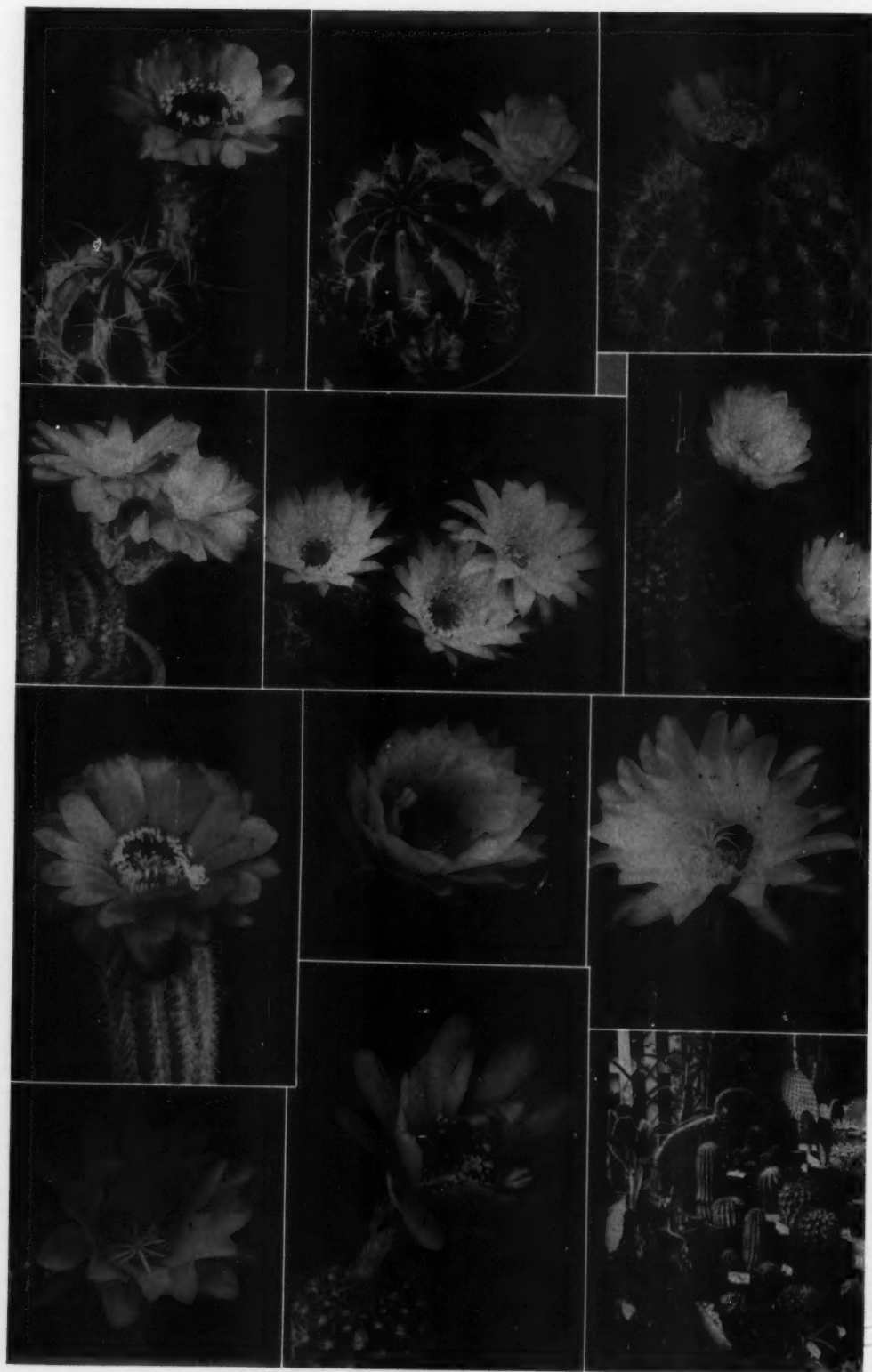


Fig. 3. From left to right. Top row: *Lobivia jajoiana*, *L. pentlandii*, *L. Blossfeld's 22a*. Second row: *L. famatimensis*, *L. longispina*, *L. aurea*. Third row: *L. andalgalensis*, *L. huascha*, *Echinopsis Lobivia* hybrid. Bottom row: *Pseudo-lobivia kermesiana* hybrid. *Pseudo-lobivia kermesiana*. Group of *Lobivias* with *Opuntias* in the back.

inches long, all curving and pointing upwards.

The tall plant at the back with the many branches is *L. andalgalensis* from Andalgala in Argentina. On the end of each branch fat blackish furry buds developed. These opened into huge tomato-red blossoms, the colour deepening around the edges of the wide petals. Short, sturdy red filaments with large yellow anthers form a circle at the base of the petals, others stand in a bunch deeper in the short tube, while the bright red style pushed up through them. The many lobed stigma lies on a petal as though using it for a cushion. This plant with so many of these large flowers out at the same time is a picture.

Another tall growing one from western Argentina is *L. huascha* from western Argentina, it was formerly known as a *Trichocereus* but has now been assigned to this group. The enormous full petalled yellow blossom is, in size and shape rather like an *Echinopsis*. The many lobes of the stigma are held upright by a cascade of deeper yellow stamens which lie like foam on the lower petals, while a fringe of stamens encircles the green throat. The plant itself is about 18 inches tall, with many sharply defined ribs and with areoles just their own width apart, each filled with many short, yellow, fine spines. The flowers appearing near the top of this long column are wonderfully displayed.

Here is one that is neither a *Lobivia*, an *Echinopsis* nor an *Eriosyce*. Perhaps it is a little of all three! Most visitors say when they see the plant "That is a lovely *Eriosyce bruchii* you have there." And until it flowered I agreed with them, for that is the name under which I received this plant. It is a perfect specimen, complete with a crown full of broken ribs or tubercles which proclaim it a *Lobivia*, or more precisely an *Eriosyce*. But when it flowered what a surprise! For instead of the expected small red flower, this plant produced the loveliest white *Echinopsis* blossom carried on a long light green tube, with short green scales with a little fine fawn hair or wool between them. The narrow back petals are pale green, the broad inner ones pure white. A single ring of stamens adorns the top of the tube while a thick bunch lying on the lower petals graduates down into the depth of the deep green throat. This throat is the blossom's chief attraction, as it is the deepest green I have ever seen on any flower—a most glorious colour bringing visions of deep green pools in the depth of the forest. And out of this emerges the cream style which extends beyond the stamens before it breaks into its many stigma lobes. To add to its loveliness it is sweetly scented. But even though

so beautiful, I was disappointed that my plant is only a hybrid after all.

Another beautiful one is *Pseudo-Lobivia kermesiana*. The large cup-shaped flower borne on a long narrow tube is in colour pinkish cerise with a deeper mid rib. Held up to the sun it is full of colour. See the flecks of red and along the edges traces of purple? The filaments are red with biscuit coloured anthers; style pink, turning to yellow at the tips where it breaks into yellow stigma lobes. It could be a smallish *Epiphyllum*! What a lovely addition to this already colourful *Lobivia* group! But look!

Here is one even more spectacular. Have you ever seen anything more lovely than that glorious deep pink bloom of *Pseudo-Lobivia kermesiana* hybrid, with its very wide petals slightly frilled and faintly etched with deeper pink? It is breath taking in its perfect beauty. Look into its deep green throat outlined with a ring of stamens, white where they join the throat but shading through pale pink to bright magenta and capped with golden anthers; and then see how the other bunch of stamens in graduated lengths, reaching from the ring right to the depth of the throat form a cradle, the anthers turning them into a frothing golden blanket to hold the cream style which breaks into ten large stigma lobes. These stamens being so many and all curving upwards appear even brighter magenta than the others, giving the blossom an exotic beauty. Narrow ray petals with a lavender sheen make a wonderful setting for the wide bright pink ones, while the 6 to 7 inch green tube holds this lovely blossom for our pleasure and admiration.

That brings us to the end of those that have flowered. *L. grandiflora* has yet to show us what it can do, although it is a large plant. *L. schumanniana* is smaller but should flower soon, so should *L. grandis*. A grand plant this one, surely it will have an equally grand flower some day. What a feast of colour to be found in one group. Is it any wonder they are so loved and cherished.

FROM PHILADELPHIA

All of us, young and old just tingle at the word "Circus". And at the October meeting the Philadelphia Cactus and Succulent Society had a real circus. Each of us, if possible, took an animal container with a planting of cactus or succulent. These were placed on the big board members' meeting table of the Morris Arboretum, Phila., in a real three ring circus setting, with a little grandstand of three shelves on which were seated the audience—miniature toby jugs, with a planting of cactus in each—these supplied by our President's wife, Mrs. Arthur Wells. Several of the feminine members were called upon to give their experience in cactus growing and loving. We had about fifty animals in our Circus. The Group is all enthusiastic about an exhibit of cactus they have been invited to have in the Philadelphia Flower Show in March.

A REVISION OF BORZICACTUS¹

By MYRON KIMNACH

1. Introduction

Although Britton and Rose are often criticized by general taxonomists for their radical generic division of the *Crassulaceae*, *Leguminosae* and *Cactaceae*, their revision of the latter family² has not only been widely upheld by cactologists but has since formed the basis for a much more radical system by Backeberg and others. The popularity of these generic systems of the *Cactaceae*, as well as an associated proliferation of ill-distinguished species, seem to have been due to the later neglect of the family by professional botanists, who were either discouraged by the well-known lack of herbarium material of cacti or who declined to work with the often inept taxonomic cactus literature. The result of their neglect is that most research on cacti has been carried out by amateur botanists, for the family is horticulturally popular, species are nearly always grown instead of hybrids, and many fanciers therefore become interested in their classification. They have, unquestionably, published much valuable data, but, having little contact with botanical literature except that of Britton and Rose and their own circle, they have also published numerous taxa based on trivial criteria. An added impetus to this practice has been the natural inclination of horticulturists to give minor variants generic or specific status, prompted largely by the fancier's viewpoint or by commercial ambition, so that minor differences rather than general similarities have been over-stressed.

It was inevitable, with such narrowly defined taxa, that species-groups or variants discovered later would not exactly resemble published ones. As it is not usual for authors to reduce taxa of this family to synonymy, or even in rank, as new intergrades appear, many increasingly narrow species have been published, often for such minor single characters as size and color of spines or flower. Many genera have also been created on the basis of one minor character, such as a slightly less spiny receptacle, or the presence of staminodial- or stem-hairs.

There has been increasing dissatisfaction with this situation. The *Cactaceae* have now become so finely divided that it is difficult to equate its units with those of most other families; a general taxonomist compiling a flora, for example,

finds that the only modern system for cacti often recognizes genera and species whose equivalents in other families would be, respectively, species and varieties. Backeberg has stated that a conservative system inadequately distinguishes groups of allied taxa, but he has never satisfactorily explained why subgeneric or subspecific status is not sufficient to emphasize the less important groups, whose delimitation is of interest to only a few, nor has he recognized the fact that an over-abundance of taxa can actually obscure relationships. Although for these and other reasons many persons prefer a conservative taxonomic treatment of the *Cactaceae*, the most recent one, Schumann's, is now largely obsolete, and I therefore believe there is need for a new conservative revision based on our present knowledge of the family.

Such a revision, however, must be done cautiously to avoid the creation of polyphyletic genera, for species sharing many characters do not necessarily share common origin and often require careful examination to be placed phylogenetically. Rowley,³ for example, is to be commended for his recent revision of *Opuntia* and its allies, but his reduction of *Marenopuntia* under *Pteridocactus* results in an unnatural genus—it is nearly certain that terminal flowering in these two genera has originated along separate lines. Secondly, to make new combinations for poorly distinguished taxa of a reduced genus, as Buxbaum customarily does, or to hastily transfer species to a genus which is too weak to be long retained, is to overload the synonymy; a revision should be thorough enough to reduce, rather than transfer, taxa undeserving of recognition.

Revisionary monographs of *Epiphyllum*, *Rhipsalis* and of *Disocactus* and its allies are being written by the author and will contain the usual discussions, keys, full descriptions, and citation of dried and living specimens examined. But many groups of cacti are not yet ready for such treatment, either because of lack of data and material, or because the influx of new forms is too constant to allow fairly definitive descriptions. Yet I believe even a non-descriptive, conservative revision of some of these groups would be of practical value at this time.

An excellent example of a much over-divided group which is ready for a reduction of taxa, but not for a descriptive treatment, is the subtribe

1. University of California Botanical Garden, Berkeley, Contribution Number 161.

2. The *Cactaceae*; Washington, 1921-1923.

3. Nat. Cact. Succ. Journ. 13: 3, 1958.

Borzicactinae Buxb.,⁴ which consists of the following genera: *Cleistocactus* Lem., *Oreocereus* (Berg.) Ricc., *Borzicactus* Ricc., *Oroya* Britt. & Rose, *Denmoza* Britt. & Rose, *Arequipa* Britt. & Rose, *Matucana* Britt. & Rose, *Morawetzia* Back., *Seticereus* Back., *Clistanthocereus* Back., *Loxanthocereus* Back., *Arequipopsis* Kreuz. & Buin., *Maritimocereus* Akers, *Bolivocereus* Card., *Submatucana* Back., and *Cephalocleistocactus* Ritt. The present paper briefly reviews this subtribe, presents a key to the genera recognized, and discusses the recognized species of one genus, *Borzicactus*.

2. Generic Criteria

Before evaluating these genera we must evaluate morphological characters in this subtribe (for a survey of the family morphology, see Buxbaum⁵). I do not consider stem-form sufficient to characterize a genus in this group, and *Arequipa* and *Matucana* are thus untenable despite their subglobose stems (there has been inconsistency in using this character, for Britton and Rose neglected to segregate, generically, similar forms in such genera as *Mammillaria* or *Echinocereus*). Spine characters are also unsuitable, and the hirsute stems of *Oreocereus* and the pseudocephalium of *Cephalocleistocactus* therefore seem to me inadequate to support those genera. It also seems unreasonable to regard a single character of fruit or seed as basis for a genus in this group. The flower, then, becomes the main basis for defining genera, as it generally does in the family. Receptacle characters, especially those originating early in bud-growth, are usually considered more important morphologically than characters of the tepals (perianth segments), but this does not mean that the limb, the most conspicuous floral part, cannot be used as a primary generic character, for to serve convenience in taxonomy a morphological hierarchy of characters need not be rigidly followed, providing polyphyletic groups are not created. Whereas receptacle differences in the *Borzicactinae* are intergrading and difficult to define, often requiring dissection to be seen, limb characters are obvious and form several distinct types. The remaining floral parts, such as the diaphragm (roof of the nectary chamber), staminodial hairs, degree of hirsuteness of the tube, length of nectary chamber, receptacle cross-section, etc., are useful in determining relationships and defining subgeneric categories, but no one of these characters seems conspicuous or important enough to form the sole basis for a genus. I therefore consider

limb characters most practical for defining genera in this group.

3. Phylogeny

It is necessary to summarize the probable phylogeny of this subtribe before monophyletic genera can be defined. Backeberg, Buxbaum and myself consider it an advanced derivative of the generic group containing *Trichocereus* and *Haageocereus*. I believe further that among species of this group, which usually have white, nocturnal flowers, the most probable progenitors of the diurnal, colored-flowered *Borzicactinae* were those resembling certain species of *Haageocereus*, such as *H. chosicensis*, with nocturnal but colored flowers; for this hypothesis there are many supporting data, both morphological and geographical.

Within the *Borzicactinae* the most primitive genera, or at least those most resembling *Haageocereus*, are *Loxanthocereus* and *Maritimocereus*, whose species possess a long nectary chamber, a rudimentary diaphragm, and fruit and seed similar to those of *Haageocereus*. From these genera, which are restricted to coastal Peru, there have developed two main phyletic lines. One group of genera, from central Peru to Ecuador, consists of *Borzicactus*, *Clistanthocereus* and *Seticereus*, all more advanced in having a short nectary chamber with a nearly complete diaphragm, *Matucana*, still further advanced in having short stems, dry fruit and coarsely verrucose seed, and, most advanced, *Oroya*, with globose stems and campanulate, actinomorphic flowers. The southern line consists of genera from Chile, Argentina, Bolivia, Peru, Paraguay and Uruguay: *Oreocereus* and *Morawetzia*, with hirsute stems, the latter with thickened, flowering stem-apices, *Bolivocereus*, with a very oblique limb and staminodial hairs, *Arequipa*, with short stems, dry fruits and coarsely verrucose seed, and *Cleistocactus*, *Cephalocleistocactus* and *Denmoza*, all with nearly closed, actinomorphic limbs, the latter genus also with thick stems, staminodial hairs, dry fruit and coarsely verrucose seed.

4. Delimitation of Genera

Before discussing taxonomy within the *Borzicactinae* the limits of this subtribe must be fixed. This is no easy task, for there is only a slight morphological gap separating some *Haageocereus* species, such as *H. chosicensis*, from some *Loxanthocereus* species; in the former the flowers are nocturnal and the limb is actinomorphic, whereas in *Loxanthocereus* they are diurnal and the limb is slightly to strongly zygomorphic. These are the only consistent differences, but I believe a generic line must be drawn between them for reasons of

4. Madroño 14: 191, 1958.

5. Morphology of Cacti; Pasadena, ca. 1950.

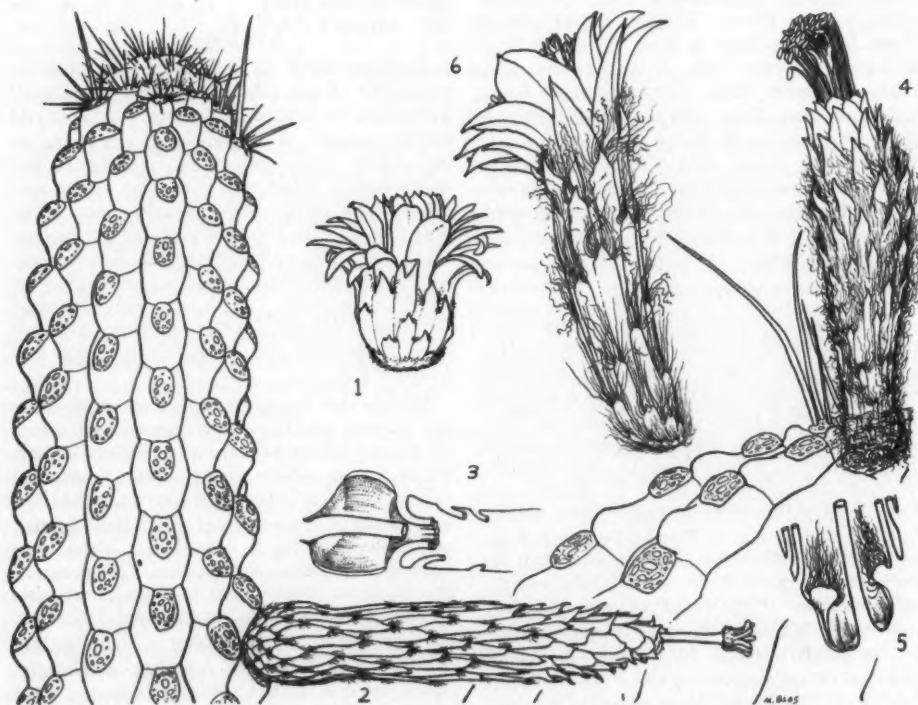


FIG. 1. Recognized genera of Borzicactinae. 1. *Oroya* (*O. peruviana*, Hutchison 666), flower, x 1. 2, 3. *Cleistocactus* (*C. morawetzianus*, Hutchison 1715), flower and stem, x 1, diaphragm, x 3.5. 4, 5. *Denmoza* (*D. rhodacantha*), flower and stem (UCBG 46.823), x 1, diaphragm (after Buxbaum, *Morphology of Cacti*), x 3.5. 6. *Borzicactus* (*B. doelziannus*, UCBG 48.104), flower, x 1.

Drawing by M. Blos, 1958.

convenience. There is a nearly unbroken line of progression through *Echinopsis*, *Trichocereus*, *Haageocereus* and all *Borzicactinae*, making it possible to recognize only a single large genus (*Echinopsis*, the earliest published) or several rather weak genera. The former course is unsatisfactory because *Echinopsis*, so widely defined, would include too great a morphological range, making it difficult to exclude many more distantly allied genera such as *Eulychnia*, *Lobivia* and *Rebutia*. If we then decide to recognize several genera we find that the species with diurnal, unexpanded or more or less zygomorphic, colored flowers (the *Borzicactinae*) can be conveniently separated from the *Haageocereus*-*Trichocereus* assemblage, which have nocturnal, actinomorphic, usually white flowers. Ritter⁶ has trans-

ferred to *Haageocereus* several diurnal-flowered species of *Loxanthocereus* with only a slightly zygomorphic limb, but, if this is followed, the remaining species of *Borzicactinae* are too similar not to be transferred also; this in turn would so enlarge the concept of *Haageocereus* as to require its union with *Trichocereus*, *Lobivia* and other genera. To provide a practical generic division of this closely intergrading group it seems clear that a line must be maintained here between nocturnal flowers with a regular limb and those that are diurnal and with a zygomorphic limb, regardless of the degree of zygomorphy. Thus, *Haageocereus* (or whatever genus it may eventu-

6. Die von Curt Backeberg in "Descriptiones Cactacearum Novarum" ... "neuer" peruanischer Kakteen, etc.; Hamburg, 1958.

ally be referred to) should not be made congeneric with *Loxanthocereus* or any other of the *Borzicactinae*.

Within this subtribe occur four major species-groups, whose most important characters are shown in Fig. 1. The most isolated genus is *Oroya*, considered by Backeberg⁷ as allied to such genera as *Parodia* and *Gymnocalycium* and by Buxbaum⁸ and myself as being a highly advanced member of the *Borzicactinae* with short, campanulate flowers which have lost their zygomorphy (1 of Fig. 1). Its stem, diaphragm, fruit and seed are of this affinity, the resemblance to such genera as *Gymnocalycium* being merely the result of convergence. *Oroya* cannot be accommodated easily in another genus and I do not hesitate to recognize it. Apparently it consists of a single, highly variable species, *O. peruviana* (Schum.) Britt. & Rose, though numerous trivial variants have recently been given specific status.⁹ Thorough field-work might eventually support retention of several of these at a varietal level.

The next most distinct genus is *Cleistocactus* (2 and 3 of Fig. 1), in which I include the recently published¹⁰ *Cephalocleistocactus*, which differs mainly in its lateral pseudocephalium, a stem-character. *Cleistocactus* is apparently monophyletic, despite its wide range of floral form and color. All species have tepals expanded slightly at the apex, if at all, and only in this are the flowers distinct in the subtribe (excluding *Denmoza*). As Buxbaum⁸ points out, limb-form is determined at a final stage of bud-growth and is therefore not a major morphological character. But it is a convenient one for defining a genus, and *Cleistocactus*, one of the most easily recognized genera in the family, is therefore recognized.

Denmoza (4 of Fig. 1) has a limb identical to that of *Cleistocactus*, but unlike that genus it also has a much-thickened diaphragm and a highly developed ring of staminodial hairs (5 of Fig. 1), the fruit is dry, the seeds are coarsely verrucose, and the stems are single and greatly thickened. In total these characters make *Denmoza* too aberrant to include in *Cleistocactus*, while if included in *Borzicactus* (in the sense defined below) it would make that genus too difficult to distinguish from *Cleistocactus*. *Denmoza*, which consists of one or two species, is therefore recognized.

The remaining species of *Borzicactinae*, assigned by Backeberg¹¹ to ten genera, apparently form a monophyletic group. Their characters are more diverse and intergrading than in the three genera already recognized. The stems may be globose to columnar, hirsute, spiny or spineless, the flowers may or may not have a diaphragm or staminodial hairs, the tube may be terete to laterally compressed and may be externally hairless to densely hirsute, the nectary chamber may be long or short, the fruit fleshy or dry, the seeds small and smooth to large and verrucose. But all species share a conspicuous character: the flowers have an expanded, zygomorphic limb, the dorsal tepals being suberect, the ventral ones more or less strongly recurved (6 of Fig. 1). The differences between the limb of these species and the unexpanded, regular one of *Cleistocactus* are not morphologically important, but they clearly distinguish two species-groups, each of which has a limb character highly unusual in the family. As each species is easily referable to either group on this character alone, and as both groups are already rather large and polymorphic, it is convenient to maintain separately from *Cleistocactus* those species with an expanded zygomorphic limb. When in flower these species are instantly recognizable as belonging to this group and it is not necessary to dissect flowers or to examine fruit and seed. I consider this expanded, zygomorphic limb to be a good, single generic character and one easily defined and remembered. None of the other, less conspicuous characters seem suitable to characterize additional genera, which are not needed in any case. I therefore include these species in a single genus, *Borzicactus*; to its synonymy are relegated eleven genera, each briefly discussed in the list of taxa concluding this paper.

A subgeneric division of *Borzicactus* would be of considerable use, for it would maintain the grouping of closely allied species which is the only justification for Backeberg's genera; but for the present none of the reduced genera are retained at any level because they intergrade or overlap repeatedly in various characters, making it difficult to draw definite lines. A tentative division recently drafted is already obsolete because of newly discovered species, and as large quantities of new material are now being imported, a reasonably definitive subgeneric scheme is not possible at this time.

Following is a key to the four recognized genera of *Borzicactinae*:

7. Cact. Succ. Journ. Am. 22: 187, 1950.

8. Sukkulentenkunde 3: 23, 1949.

9. Beitr. Kenntn. peruan. Kakt.; Heidelberg, 1958.

10. Succulenta 1959: 108, 1959.

11. Die Cactaceae; Jena, 1958.

- Flower campanulate *Oroya*
- Flower tubular or funnelliform
- Limb nearly always oblique, only the ventral tepals expanded or,
 rarely, all expanded *Borzicactus*.
- Limb usually regular, the tepals not expanded, or slightly ex-
 panded only at apex
- Staminodial hairs present; fruit dehiscent when dry; seeds
 large, coarsely verrucose; plant single-stemmed, globose to
 stoutly columnar *Denmoza*
- Staminodial hairs lacking; fruit dehiscent while fleshy; seeds
 small, finely verrucose; plant caespitose, the stems thinly
 columnar *Cleistocactus*

5. The Species Problem in *Borzicactus*

Not only have too many genera been published in the *Cactaceae* but the number of species also has multiplied beyond reason. If species in other families are not usually established for one or several trivial, differing characters there can be no reason why they should be in this family. Yet there exists a pronounced tendency for many cactologists to give specific rank to a new variant differing from an older species only in such minor characters as the number of ribs, size or number of spines, or degree of hirsuteness of flowers, instead of considering such a form an extension of the morphological range of the older species. Practically all plant species vary, and many cacti, being actively evolving, are especially prone to it; the classification giving the clearest picture of this variation would be one grouping obviously related variants under one species, giving the more distinct ones varietal rank if necessary.

One of the many examples in *Borzicactus* are the four species of the Rio Rimac, Peru, placed by Backeberg in *Loxanthocereus*. These species can be distinguished, though with some difficulty, but, using the same criteria, as many new species of *Loxanthocereus* could be published for other plants I have seen from the Rio Rimac; however, to recognize so many weak species from such a small area seems unreasonable. If these forms are not new species then they must be referable to the older ones, even though the latter were so narrowly defined that they do not match them in many respects. If each is assigned to the older species which it most resembles it is found that both old and new variants form a closely intergrading morphological series or cluster of which no unit is sufficiently distinct to be considered a species. From this it can be concluded that they all belong to one variable species. They must then be reduced to synonymy under the old-

est, *B. acanthurnus*, whose description is emended to include this expanded morphological range. Far from being a reactionary procedure, as Backeberg has implied, the uniting of weak taxa is a basic, progressive technique in taxonomy and one insufficiently applied to the *Cactaceae*.

In the genera which I reduce under *Borzicactus* no less than 70 species are recognized by Backeberg, whereas I recognize only 18 (besides 3 unpublished ones discovered by Johnson or Hutchison and not discussed in this paper). Such an extreme difference in the species concept illustrates the predominance of personal opinion, rather than a hypothetically "correct" viewpoint, as the strongest factor in taxonomic work—yet I believe my concept of a species approximates that used by most taxonomists, while Backeberg's represents an extreme which is seldom followed.

I have studied field-collected and field-annotated, cultivated material of all 18 of the recognized species, and flowers of all but *Oreocereus trollii*; however, only field-work can decide the actual worth of several which I have had to recognize or reject rather arbitrarily due to lack of data. Several of those reduced, such as *B. tessellatus* and *B. morleyanus*, have some justification as species, but they are weak, and those in which they have been included are now made more easily definable. Several recognized, such as *B. acanthurnus* and *B. aurantiacus*, are so variable that they should probably be divided into sub-specific categories. However, a subspecies or variety is not a single plant, but a population distinguished in morphology and distribution from one or more additional conspecific populations. Few of the species reduced here to synonymy can be retained as varieties because it is still unknown whether they represent geographically isolated, more or less monomorphic populations, or distinct but individual clones, or recurrent forms appearing intermixed with others over a wide

area. It is only by thorough field-study that useful subspecific categories can be defined, and field-collectors of cacti have so overemphasized the finding of "new" species that practically nothing has been published on the distribution, variation, intergradation and natural-hybridization of older ones. Because varieties differ less than species it is likely that any recognized at this time would quickly become obsolete as intergrading forms appeared in the vast amount of new material now being imported—and the synonymy is already overburdened. Therefore, while I could recognize several apparently strong varieties in *Borziocactus*, I recognize none at this time; as certain species become better understood they will perhaps be subdivided, using some of the presently rejected names. In the meantime, fanciers who are distressed at seeing well-known names in synonymy should remember that taxonomy does not exist primarily for labeling horticulturally interesting forms but instead is concerned with the classification of plants as they occur in the wild, where minor or even clonal differences are of much less significance.

6. The Literature

The most serious obstacle which one encounters in work of this sort is the taxonomic cactus literature, which has an unfortunate but well-earned reputation of inferiority. The earliest

published species of cacti were no more poorly described than those of other families, but standards and techniques in botany have since progressed and there can now be no excuse for describing a new taxon in one short sentence or with inexact locality data. Of the many who are guilty of such practice Backeberg is the most flagrant offender; in many respects he has contributed more to our knowledge of cacti than anyone since Britton and Rose, yet he has so inadequately described his hundreds of new taxa that the resulting confusion will plague botanists for many generations.

An associated problem is found in the recent, generally excellent work by Rauh.⁹ Although he usually follows Backeberg's classification, he at least describes taxa in detail so that it is possible to evaluate many of the novelties co-authored earlier by Backeberg and himself. But there is also in their works an unseemly urgency to publish species before the flower or even the generic alliance is known. Consequently, many of their taxa can neither be accepted nor made synonymous with older ones because their descriptions are inadequate for determining distinction. I consider that the burden of proof of distinction rests with the authors of taxa, and I therefore must consign such taxonomic miscarriages to the category of insufficiently known species.

To be continued

INEXPENSIVE, ADJUSTABLE, GREENHOUSE SHADING

By IRVING G. REIMANN

Redwood fencing has proved to be a most adaptable material for providing broken shade in my Orlyt aluminum greenhouse. Other wood would serve the purpose equally well temporarily, but redwood was selected because of its resistance to rot and warping. After the wood has been cut to proper lengths, the slats can be installed without tools of any kind. Only wooden spring-type clothespins and C-clamps are necessary for a completely satisfactory, easily changed arrangement.

The cross section of the inner or lower part of the roof glazing bars is shaped like an inverted T (\perp). If the slats are wanted to run horizontally, or parallel with the ridge, as in a north-south running greenhouse, the slats are simply laid between the \perp of one roof bar and the \perp of the next one and are kept separated by redwood spacers of any desired length. The slats are kept from sliding down the roof glazing bars by clamping a clothespin on the \perp 's against the edge of the

lowest slat. In a greenhouse with the ridge running east and west, where roof slats are wanted to run transversely to the long dimension of the greenhouse, two horizontal slats can be put in place near the top and the bottom of the roof glazing bar and kept from sliding with clothespins. Other slats can then be put on top of them to run "vertically" between them and the glass. These can be kept from sliding down by a thicker horizontal slat across the bottom.

On the sides of the greenhouse I prefer to have the slats vertical. This can be accomplished very easily by using C-clamps to secure a wooden bottom strip horizontally to the \perp of the side glazing bars just beneath the eave bar. The tops of the slats are slipped between this strip and the glass, and the lower ends of the slats can stand on the sill, with or without spacers—more easily done than clearly described.

I use 2" by $\frac{3}{4}$ " redwood fencing. This comes dressed to 1 $\frac{3}{4}$ " by $\frac{3}{8}$ " and costs four cents per

foot in Ann Arbor. About 34' per pane, including spacers will provide good shade. Instead of using the fencing as it comes, I have it ripped down the center. This provides slats $\frac{3}{4}$ " by $\frac{3}{4}$ " in section. My horizontal roof slats are 30 $\frac{1}{4}$ " long, and the vertical slats for the side windows are 48" long.

The spacers are cut from the slats into one inch lengths. Thus, since the spacers have three different dimensions, the same ones can be used to provide three different spacings, and can be used in combination to provide many variations.

The thickness of the slats ($\frac{3}{8}$ ") provides deceptively more shade than would a very thin stock such as metal strips except when the sun is shining straight through them. For instance, equal width of slats and interspacers provides considerably more than half shade, just how much depends on the direction of the slats and the ridge of the greenhouse, and the season of the year. This did not occur to me when I bought the materials, and ever since the first installation

I have been removing more and more slats and spacing the remainder farther apart, especially on the northeast slope of the roof which the sun's rays hit at a rather low angle, especially during winter. However, the money I wasted in buying too many slats I gained in unexpectedly having an extra supply of very good garden stakes.

It would be misleading to say that day-to-day, or hour-to-hour adjustments are easy with this system of shading, but rearrangements of spacing every three to six months really take very little time. It is a good idea to prepare a spacing which seems to meet your requirements, and then check the amount of sun which passes through by squinting at the sun from about bench level, in mid-morning, at noon, and in mid-afternoon. You will probably make some readjustments. Because of the thickness of the ridge bar, the eaves bars, and the glazing bars, the nearest slat parallel to any of them, should not be placed too close, or too wide a band of solid shade may be cast for too long a period.

*Director the Exhibit Museum
University of Michigan*



FIG. 5. Interior view of the Orlyt aluminum greenhouse.

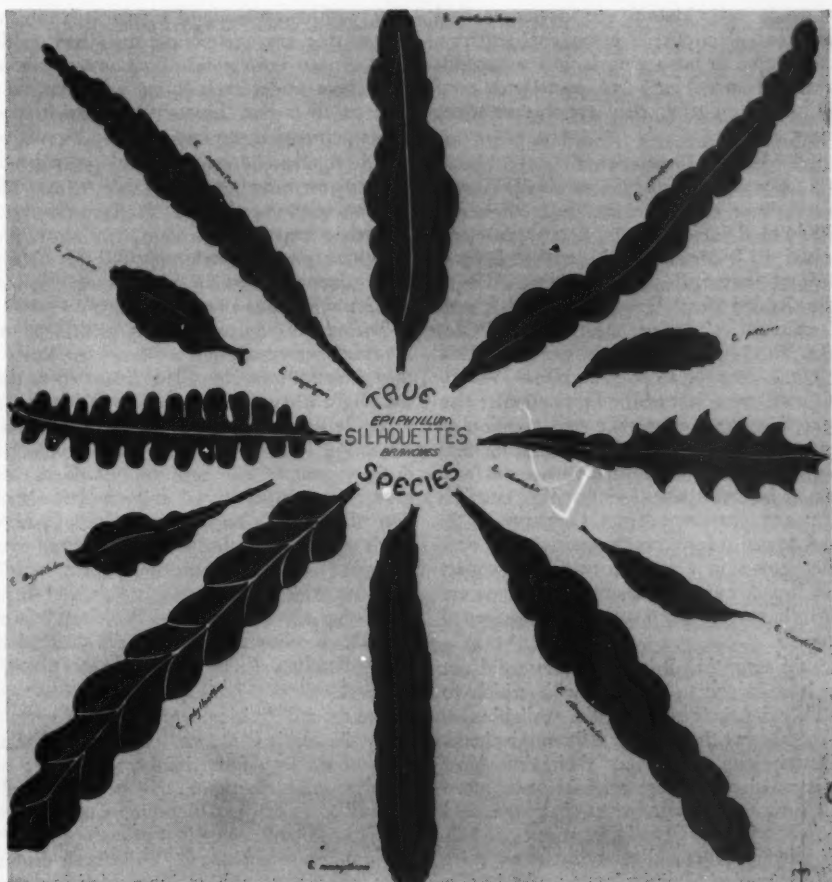


FIG. 6

Legend: Clockwise starting at top center. *Epiphyllum guatemalense*, *E. strictum*, *E. pittieri*, *E. darrahii*, *E. caudatum*, *E. stenopetalum*, *E. macropterum*, *E. phyllanthus*, *E. oxypetalum*, *E. anguliger*, *E. pumilum*, and *E. crenatum*. All are species.

CACTUS ORPHANS—A CHALLENGE

By MRS. CACTUS PETE

The Epiphyllum is a genus of jungle cactus with wonderfully beautiful white flowers. We often find wild plants growing on the ground, but the vigor and great beauty of the tree-grown plants prove them to be true epiphytes, for they are certainly happiest when growing high in the jungle, or rain forest trees, with their friends the bromeliads and the orchids.

The Epiphyllum Society of America is probably the largest single Garden Club in the World, devoted to just one specific section of the fantastic cactus clan—namely the Epiphyllum. The wide range of its membership throughout the

world clearly indicates the great popularity of these plants. This is, however, misleading since the members are primarily interested in the Epiphyllum hybrids and show but small interest in the true species which have produced these unbelievably beautiful colored hybrids, better known as Orchid Cactus.

The wild species, whose grogeous hybrids have perhaps done more to popularize cactus than any one other species... are they really orphans of the cactus world? Few seem to care about them, their history, their names, or even to grow them in their collections of other cactus.

When we do try to identify our species, we find only meager descriptions, often contradictory, often extensive in measuring length and width of petals, stamens, etc., but sometimes even forgetting to tell us if they are day or night bloomers.

Muriel Merrill's illustration (Fig. 6) shows us stem-types of twelve of the originally named species. Britton and Rose list four others: *E. grandilobum*, *E. lepidocarpum*, *E. cartagense* and *E. hookeri*. E. J. Alexander (New York Botanical Gardens) names *E. chrysocardium*—Alexander, the Golden Heart Epiphyllum, with a very fine description (C. & S. Journal, Vol. XXVIII, page 3). The Missouri Botanical Gardens (Vol. XLV, No. 1, Page 87) names *E. gigas*—Woodson & Cutak, the Giant of the Epiphyllums; also with excellent description. We find mention of *E. conzatti*, *E. pfersdorffi*, *E. thomasiana* and many others. Some prove to be synonyms and others may be true species. A very old plant imported many years ago from Germany as *E. wercklei* seems to have no recognition as a species, but grows in a very distinctive, compact mass of broad, but short stems. Its blooms are similar to *E. stenopetalum* with its grey-pollened stamens.

It would seem that Britton and Rose did not always have adequate material with which to work. They did their best with the available material, but had not the time for a thorough checking. Descriptions made since their time have been patterned after those original ones, often without sufficient knowledge to challenge, add to, or change in any way. Those who have followed in their footsteps, discovering new species throughout tropical America, seem to be in one of two categories—either do not have the educational ability to classify and name their finds, or, having this knowledge, do not seem to have the desire to do so. Thus these lovely orphans are becoming widely distributed throughout the United States and foreign countries, without names, and often completely losing their identity as to place of origin, etc., the very things which might eventually lead to their true identification. Many of these newly collected species are in some of our finest Botanical Gardens and Arboretums where they are being checked, but the process, to be accurate, must needs be slow. *E. macropterum* is illustrated as having a woody edge, similar to *E. strictum*. Another illustration shows it without that edge. Thus we see how important it is to make careful identification, or descriptions, of new species. Our sincere thanks go out to such men as E. J. Alexander, Myron Kimmach and Ladislaus Cutak, all of whom we know are making real efforts towards identifying these newer species. These men are all very

busy with many kinds of plants. It is too much to ask that any one person specialize on these poor orphan Epiphyllums but someone needs to take them under their wing, adopt them, and help us all to end the confusion which already exists before it is too late.

The commercial growers have great need for properly identified plants for comparison. These growers wish to cooperate. We respectfully suggest that Botanical Gardens, having properly identified plants, would do well to distribute them among the commercial growers, who are so deeply interested in this project.

To help the amateur in his identification of his true species, we like to divide the Epies (as they are affectionately called) into two sections: the Night Bloomers and the Day Bloomers. The first division, often incorrectly called Night Blooming *Cereus*, we like to divide into three distinct groups. The first we call the *Strictum* group, since *E. strictum* has the widest distribution of its class. These plants all have fibrous stems with narrow, brownish, somewhat woody margins. The flowers are daisy-form, opening very flat with extra narrow petals and having very long, pencil-like tubes. We find *E. stenopetalum*, *E. pittieri*, *E. strictum*, *E. guatmalense*, *E. phyllanthus*, *E. hookeri* and our plants of *wercklei* and *conzatti* in this group.

The second division we call the *Oxypetalum* group since this is the well known Dutchman's Pipe, or Queen of the Night, which has such world wide distribution . . . the plant most often referred to as a Night Blooming *Cereus* in eastern United States. The plant growth of the *Oxypetalum* group consists of two distinctly different types of stem growth . . . long spindling stems, terete or somewhat angular, topped gracefully with sprays of flat, somewhat wavy, almost papery, fibrous stems. These flowers have the typical Dutchman's Pipe form, the cup and saucer with its more or less curved, swan-like neck of tube and ovary. In this group we find *E. caudatum*, *E. pumilum*, *E. oxypetalum*, *E. grandilobum*, *E. cartagense*, *E. macropterum* and probably the new *E. gigas*.

The third group of night blooming Epies have perhaps the most interestingly beautiful plant growth of all the Epies. These are the Fish-bone, or Ric-Rac species. We call this the *Anguliger* group. Here we find no signs of the fibrous stems but, instead, rather lush succulent plant growth which suggests ferns with their unusually deep zig-zag lobes. The flowers are similar in form to the *Oxypetalum* group. Here we place *E. anguliger*, *E. darrahii* and the new *E. chrysocardium*.

The night Bloomers are mostly loved for their long blooming periods. The *Strictum* group

starts to bloom in mid-May or early June and the older specimen plants produce a continuous series of flowers, one after another. The older, more pot-bound plants may produce as many as five or six series each summer.

The *Oxypetalum* group starts to bloom a little later but healthy specimen plants usually produce new buds before the older ones have completely bloomed out, so that there is an almost constant series of buds or flowers. This is especially true of *E. pumilum*, which we consider the best of its class. The plant is rather small and compact. Even though the flowers seem to be the smallest of the true species, the plant produces an abundant sequence of buds and flowers, literally frosted with bloom until the weather is cold enough in the Fall to blast its last buds.

In Guatemala, we found a species in this class which is extremely graceful, with long pendulous branches and small compact growth. We believe it will prove to be an exceptionally fine plant, even though it has not yet flowered for us.

There seems but little fragrance among the night bloomers, however most of the day bloomers have a rather strong, lily-like, night fragrance which vanishes with the rising sun. One of the new base-bloomers which we found in southern Mexico, is so very fragrant that a plant, blooming in the house, is overwhelming with its strong scent. This plant has small, stubby growth. Using it for hybridizing, we have produced an entirely new series of lovely, small growing, Orchid Cactus.

We like to divide the day blooming species into two groups; the tip bloomers and the base bloomers. We call the tip bloomers, the Cre-

natum group, since it seems to be the best known of its class. Crossed in Europe, about 1830, with *Heliocereus speciosus*, *E. crenatum* formed the first hybrids, the original parents of today's Orchid Cactus. Nature had already produced a wild Mexican hybrid, *ackermannii*, probably a cross of *Heliocereus cinnabarinus* and an unknown Epi parent. It had escaped into many parts of the Mexican jungle. Being a hybrid, it had several distinct forms, which accounts for the great variation of plants brought into the United States by the Mexican immigrants and now cultivated under that name, but often confused with the wild species of *Nopalxochia ackermannii*, an entirely different plant. *Kinchin-junga* (C. A. Purpus), a wild species mistakenly given a Horticultural name, belongs in this *Crenatum* group. This group usually blooms in April and May. The stems are widely lobed and succulent. The flowers are typical cups and saucers, with beautifully reflexed back petals and sepals.

There seems to be no one named species in the base blooming division, although there have been several new ones found in the last few years. There is some thought that perhaps *Cooperi*, and even *Pfersdorffii*, are, in reality true species. Plants now being collected in the jungle seem to be nearly, and perhaps are, identical. Their history is somewhat clouded and indistinct. Britton and Rose states that *Cooperi* is *E. crenatum* x *Selenicereus grandiflorus*. John Rodgers (C&S—Vol. XV, page 90) says *Cooperi* is *Selen. grandiflorus* x *E. hookeri* and one of the older German books gives still another history of the plant. Simon says it is *E. crenatum* x *C. pteranthus*. Foster, 1886, said it was an English



FIG. 7. *Epiphyllum pumilum*, commonly known as Night Blooming Cereus, is spectacular when in flower.

hybrid. Werdermann said it is "universally confused" with *Pfersdorffii*. If these should eventually prove to be species, they would certainly belong in this base blooming section. Through habit, we have called this division the Cooperi group since it seems most typical. Several of the newly collected, as yet unnamed species belong here. These all have fine fragrance with flowers which seem to sprout out of the very soil in which they grow. Occasionally, but seldom, they will bloom higher on the stems. The plant growth is stubby and dense. The stems are succulent, never fibrous, with almost indiscernible lobes. The base of even mature growth is quite setose, whereas the other species are setose mostly on seedling growth. This group flowers in June and forms the basis for a number of late-blooming hybrids, which greatly help prolong the flowering season of the Orchid Cactus.

We have long tried to hybridize with the night bloomers. We find they seem to cross readily among themselves but have yet to find one authentic instance where a successful cross has been made between day and night blooming *Epiphyllums*. Often we believed we had succeeded only to find that seeds, so formed, were infertile or reproduced only on the mother plant with no sign of the male parent, thus proving our cross unsuccessful. Other hybridizers have claimed to have made such crosses but we have not seen the evidence anywhere. Old records were seldom well kept and it is understandable

that one might for instance see the setose growth of Cooperi and believe it to be a new seedling. Knebel stated he had made *cereus* crosses but he was speaking of his *Heliocereus* hybrids. After years of trying, we do believe that it cannot be done.

It seems that the seeds of the night Epies are larger, quite rough, and shaped like small beans. Day Epies have very bright, shining seeds, nearly round. It would even seem that perhaps some day the night bloomers, being so very different and uncompatible with their sisters, the day bloomers, might well be removed from the *Epiphyllum* genus, into one of their own.

These are but the thoughts of a strictly amateur "botanist". Our wish is, not to confuse, but to help clear up the big mixup of our beloved *Epiphyllums*. We hope that our notes may help someone who follows. Often times the one who merely grows and loves his plants may notice small things which a professional botanist would not have the opportunity of noting for himself. Who will pick up the challenge and personally adopt our orphan Epies?

Myron Kimmach's *E. cartagense* (Vol. XXX, page 23) with its extensive description, detailed references and excellent illustrations is a perfect example of exactly what is needed and is a very real contribution towards a better understanding of the true species of *Epiphyllum*. Congratulations, Mr. Kimmach, keep up the good work.



FIG. 8. Mr. and Mrs. Dudley Gold were chosen king and queen at the 1958 convention. They represent the Mexican Society who will be our host in 1961. (Moorten photo)

QUESTIONS and ANSWERS

Conducted by
HARRY JOHNSON
Paramount, Calif.



Question: Last fall I received an *Echinomastus johnsonii* from San Saba, Texas. It is ready to bloom and I was checking the color of the blossom in Marshall's "Cactaceae" and found he made reference to Baxter's "California Cactus". Baxter's article states: "It grows in soil heavy with lime and apparently will not thrive without this substance. Plants are not often seen because of the heavy mortality in collected specimens due to this lack of proper growing medium". It has been my understanding that cactus do not want lime and many references have been made to water with or without lime. Is this an exception to the rule?

Mildred Wellbaum, Oregon

Answer: As regards lime requirements for cacti. Much has been written through the years but little actual experimentation has been done. From the practical standpoint they do not necessarily need lime but will tolerate it, a very different thing. A neutral soil or one slightly on the alkaline side seems to suit all the desert types of cacti. Some of the epiphytic or rain-forest cacti seem to like a definitely acid soil.

Hard water may have many things in it besides lime. Common table salt and Epsom's salt often found in water in fairly large amounts are very detrimental to plants. I have raised many millions of cacti and of late years have not added lime to our ordinary potting soils. If you are using a pure silt sand such as in the U.C.L.A. mixes, some lime as carbonate of lime and dolomitic lime seems to be called for, for the sand is inert being mostly silica.

Echinomastus johnsonii is a very difficult subject and few collected plants last long under greenhouse or garden conditions. I have grown them with some success in a very gritty granite with some leafmold and silt, no lime. Very little water. It has a wide distribution seeming to favor locations where summer temperatures are high and winter temperatures often low. The type locality is St. George, Utah. The plant was named in 1871 by Dr. Parry after a local botanist of St. George. Distribution from south eastern California, Arizona, Utah, Nevada and probably New Mexico and western Texas.

Question: How does one import cacti from Mexico?

Frances V. Moltzen, Texas

Answer: Our own government has some restrictions and the Mexican government has many others. Also the port of entry may have special restrictions as apparently at Brownsville. Also you are dealing with human beings who may interpret laws in different ways. I would suggest that you write directly to the Plant Quarantine Office at Hoboken, New Jersey. They will tell you about the U. S. restrictions if any. On the Mexican side I would say the most sensible way would be to employ a Mexican customs broker to handle the red tape. That is their business and I have always found it best to go through channels as port officials generally back them up. I have never personally collected cactus along the border to bring them back, except Baja California, so have no personal experience. Each story I have heard from those who have brought plants seems to be different. There are reputable dealers in Mexico who sell and take care of the details. There are Mexican export duties and U. S. import duties.

In 1961 our Convention group in conjunction with the Cactus and Succulent Society of Mexico hope to get permits for all those who want to bring back their finds. Details will be published in our Journal before the Convention.

Question: I have a "Flora-Cart" set up with fluorescent lights and also have southwest facing windows. I am wondering if it would be worthwhile to use fluorescents to supplement the sunlight and if so whether such added light should be turned on and off at daylight and sundown or used for extended periods of 12 to 15 hours or more as is advocated for other plants.

Miss Agnes Hirshinger, N.Y.C.

Answer: There is no sure data on the reaction of cacti to fluorescent lighting. It quite possibly would be beneficial as an aid to the winter sunlight in the north. Most of the cultivated cacti are to be found between the Tropics of Capricorn and Cancer where the day and night periods are fairly even throughout the year. If the lights were fairly close to the plants and run for about 12 hours each day it would be interesting to have a report in the spring if you had a series of check plants to compare.

Please send your questions to Harry Johnson, Johnson Cactus Gardens, Paramount, California.

EPIPHYTELLUM HANDBOOK—Scott E. Haseltin

The purpose of this book is to help one to know and enjoy his plants to the fullest extent. For the scientific minded there are descriptions of the genera in the Epiphyllanae and the keys of Schumann, Berger, and Britton and Rose. For the beginner, the pictures alone will tell the complete story of these fascinating plants—how to make them grow and flower. *Contains:* 250 pages 5½ x 8 in., 170 photographs, color plate. Bound in Buckram \$4.00

Abbey Garden Press, 132 W. Union St., Pasadena, Calif.

CULTIVATED AND NATIVE AGAVES IN THE SOUTHWESTERN UNITED STATES

AUGUST J. BREITUNG

1416 S. Glendale Ave., Glendale, California



FIG. 9

Agave utabensis (typical). Grown by Don Skinner, Los Angeles, Calif., introduced from Beaver Dam Mts., vicinity of St. George, Utah. Approx. natural size.

PART 6

Agave utabensis Engelm in S. Watson, Bot. King. Expl. 497, 1871.

A. scapboidea Greenman & Roush, Ann. Mo. Bot. Gard. 16: 391, 1929.

A. utabensis var. *scapboidea* (Greenman & Roush) M. E. Jones, Contrib. West Bot. No. 17: 19, 1930.

A. baynaldii var. *utabensis* Terraciano, Primo contributo ad una Monografia delle Agave, Napoli 28, 1875.

Field and herbarium studies indicate five rather well marked geographic entities of *Agave utabensis* designated here as varieties.

Key to the varieties of *Agave utabensis*

Spine 1 to 3 cm. long.

Rosette 2 to 3 dm. in diameter, caespitose, usually producing numerous offsets; terminal spine sessile.

Leaf margin sinuate. *A. utabensis* var. *typica*.

Leaf margin straight. *A. utabensis* var. *discreta*.

Rosette robust, 6 to 10 dm. in diameter, solitary; terminal spine decurrent for 10 to 15 cm. *A. utabensis* var. *kaibabensis*.

Spine 3 to 20 cm. long.

Leaves glaucous-green; terminal spine slender, dark brown, 3 to 8.5 cm. long. *A. utabensis* var. *nevadensis*.

Leaves olive-green; terminal spine stoutish, ivory colored, 10 to 20 cm. long. *A. utabensis* var. *eborisipina*.

***Agave utahensis* var. *typica*.**

Rosette caespitose, usually with numerous offsets, 2 to 3 dm. in diameter; leaves 12 to 20 cm. long, 2 to 3 cm. broad, glaucous; armature at first brown, becoming gray; spine 1 to 2 cm. long; teeth slightly curved, 1.5 to 2 mm. long, 2 to 3 cm. apart between which the margin is sinuate and herbaceous; flower-stalk 1.5 to 2.5 m. high, inflorescence a narrowly racemose panicle, flowers yellow 22 to 30 mm. long, including the ovary; filaments inserted near the middle of the short, broadly funnelform perianth tube. June-July.

Distribution: desert and mountainous areas at 1,000 to 2,500 m. elevation; Utah, Beaver Dam Mts., north to Silver Reef; type locality, St. George.

***Agave utahensis* var. *discreta* M. E. Jones, Contrib. West. Bot. No. 17: 19, 1930.**

A. newberryi Engelmann in S. Watson, Bot. King. Expl. 497, 1871.

Distinguished by the light green leaves, short spine, brown-based teeth between which the margin is straight.

Distribution: South of the Grand Canyon, Arizona, from Peach Springs (type locality of *A. newberryi*) to Oatman (type locality of *A. utahensis* var. *discreta*).



FIG. 10

Agave utahensis var. *discreta*. Grown by Don Skinner, Los Angeles, Calif. introduced from Peach Springs, Arizona. Approx. $\frac{1}{2}$ natural size.

***Agave utahensis* var. *kaibabensis* (McKelvey) Breitung, stat. nov.**

A. kaibabensis McKelvey, Journ. Arn. Arboretum, 30: 227, 1949.

Distinguished from all other variations of *A. utahensis* by its colossal size, mature rosettes measure from 0.7 to 1.4 m. in diameter, solitary, rarely with 1 to 3 offsets; leaves straight, 3 to 3.5 dm. long, 5 to 6.5 cm. broad, light green; armature gray, brown-based; spine 1 to 3 cm. long, decurrent for 10 to 15 cm.; teeth 1 to 2 cm. apart, 1.5 to 3.5 mm. long, curving either backward or forward; flower-stalk 4.5 m. high.

Distribution: Arizona; Grand Canyon and its tributaries (north rim below Kaibab Plateau, the type locality). Plants observed at Scenic View, Little Colorado Canyon 11 miles west of Cameron are identical with those at the north rim.

According to E. F. Castetter, et al, in "The Early Utilization of the Distribution of Agave in the American Southwest", Univ. New Mexico Bull. 335, page 37, fig. 4, 1938, mescal

pits occur at numerous localities throughout the Grand Canyon. Published photographs of this plant are cited by McKelvey, l.c. 229. In addition, photographs have appeared in the following publications: A. Berger, *Die Agaven*, 106, fig. 21, 1913, as *A. utahensis*; Check List of Plants of Grand Canyon National Park, Natural History Bulletin No. 6, 1936 (front cover); L. Benson & R. A. Darrow, *Manual of southwest desert trees and shrubs*, Univ. Ariz., Bull. 15: 91, 1944; *Arizona Highways* 21(4): 26, 1945 as "Yucca"; *Arizona Highways* 30(3): 35, 1954; Grand Canyon National Park, U. S. Dept. Interior, Washington, 1955 (front cover).

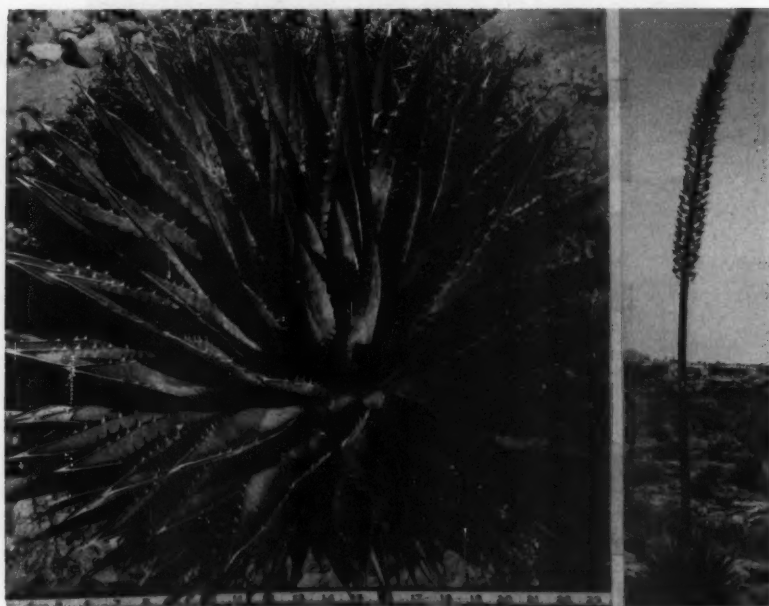


FIG. 11

Agave utahensis var. *kaibabensis* in natural habitat, edge of canyon of the Little Colorado River, 11 miles west of Cameron, Arizona. Left: rosette approx. 1/7 natural size. Right: inflorescence approx. 1/36 natural size.

Agave utahensis var. *nevadensis* Engelm. in Greenman & Roush, *Ann. Mo. Bot. Gard.* 16: 390, 1929.

A. nevadensis (Engelm. ex Greenman & Roush) Hester, *Cactus & Succ. Journ.* 15: 133, 1943.

Leaves glaucous-green as in var. *typica* but distinguished by the much longer terminal spine which is 3 to 8.5 cm. long.

Distribution: California: Ivanpah, Clark and Kingston Mts. (according to Munz & Keck in *Calif. Flora*, 1363); type locality, Ivanpah Mts. Nevada: Potosi and Charleston Mts.

Agave utahensis var. *eborisipina* (Hester) Breitung, *stat. nov.*

A. eborispina Hester, *Cactus & Succ. Journ.* 15: 131-133, 1943.

The ivory colored spine 10 to 20 cm. long, large 5 to 7 mm. long teeth and light green, not glaucous leaves distinguish this variety.

Distribution: Nevada; Sheep Range Mts. (type locality: Peek-a-boo Mtn.) approximately 35 miles north west of Las Vegas and Sunrise Mtn.

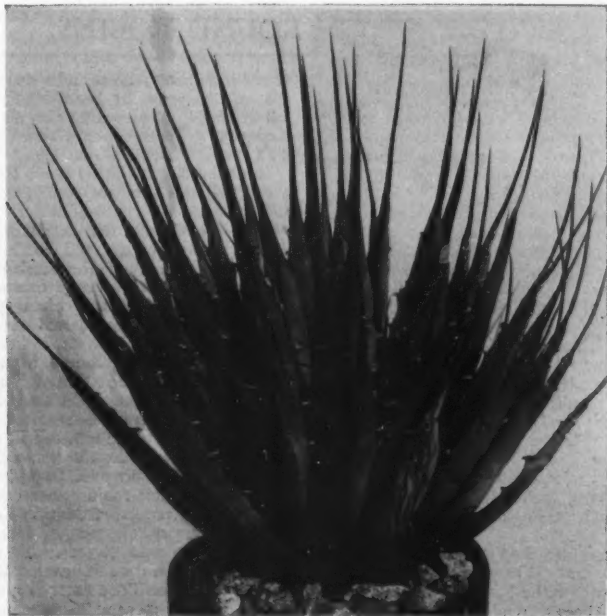


FIG. 12

Agave utabensis var. *nevadensis*. Grown by Don Skinner, Los Angeles, Calif., introduced from Mescal Ridge, Ivanpah Mts., Calif. Approx. $\frac{1}{2}$ natural size.

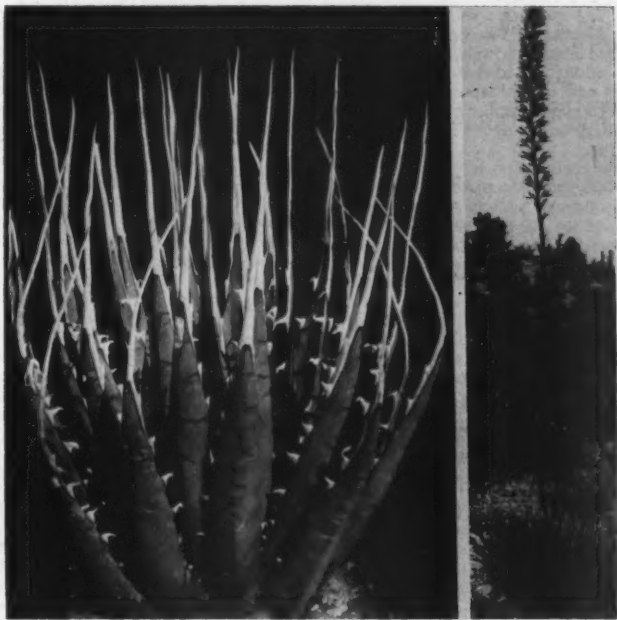


FIG. 13

Agave utabensis var. *eborispina*. Grown by Madame Ganna Walska, Santa Barbara, Calif., introduced from Peek-a-boo Canyon, Sheep Range Mts., Nevada. Left: rosette approx. $\frac{1}{2}$ natural size. Right: flowering plant in natural habitat, $\frac{1}{24}$ natural size.

SPOTLIGHT ON ROUND ROBINS

January is that month with two opposite faces, one looking backward and the other forward to new horizons—a beginning month for fresh starts and new adventures. Thus it is a favorable time to review the record of our robins for the past year, as well as to give a thought to the future. Wouldn't you like to join a robin, perhaps in the next month or two? It could bring you not only the pleasantest hours but new friendships as well.

Our robins have grown to thirty-one during the past year and seven of them are new. They are the Echeveria, the Seed Propagation, Opuntia, Stapeliad, International No. 5, Rare Cacti and Crests and Cactus and Succulent No. 7 Robins. Out of the total number there are five Robins unreported, three of which must be re-established. Otherwise the robins are making their rounds cheerily and to the great satisfaction of our members.

In the last three months of 1959 the following members have been added: Mrs. R. D. Myers, Arvada, Colorado; Mrs. Vladislav Zumar, Jr., Cedar Rapids, Iowa; Mrs. Ruby McMahon, Texas; Mrs. H. E. Cook, Soquel, California; Mr. Roger Jensen, Lake Park, Minnesota; Mrs. John L. Vaninetti, Snohomish, Washington; Mr. R. Moreton, Birmingham, England. It is a pleasure to welcome you all.

On looking to the future, the list of new robins desiring members follows and awaits your pleasure. A letter or a card will put you on the list of the one you want if you will but take time to send it to me. The robins are: Epiphyte (Rain forest plants) Robin, 6 members; Mesembryanthemum Robin, 6 members; Yuccas, Agaves and Aloes Robin, 6 members; C. & S. Robin No. 8, 1 member, a man preferred; C. & S. Arranger's Robin, 3 members; The Stapeliad Robin, 5 members; C. & S. Robin No. 7, 3 members; Window Sill Robin No. 2, 4 members; Mammillaria Robin No. 2, 4 members from the United States; Succulents Only No. 2, 6 members. Just as a reminder to those writing to join any of these robins and unfamiliar with the requirements, it is necessary to be a member of the Cactus and Succulent Society of America before I may place you in one.

The news from the robin letters contains many items of interest. The first one comes from Les Williamson in New Zealand who mentions potting mixtures and an experiment "involving the use of pine needle compost instead of the normal leaf-mould". He said, "The experimenter found that *Echinocereus dubius* and *Mam. compressa* favored our pine needle compost, growing one half times as big again as those in the mix of leaf mould". He also mentioned, "I have been potting up with some crushed sea shells in the mixture and I find it provides a good slow source of lime. Crushed egg shells are very widely used in mixes here. We put them through the mincer". David Watling, of the same International Robin No. 5, speaks on "theories of soil acidity/alkalinity" saying, "There is an ardent cactophile in England, John D. Donald by name, who maintains that whatever soil you put your plants into, in a year or so they will change it into what they like. It would be interesting to check this with say six different soils and all equal (as near as possible) specimens of the same plant".

In Robin No. 6 Joyce Churchill enclosed a white plastic marker she uses for her plants saying, "These are heavier than most markers". It brought a reply from Irma Huch in Illinois who said, "I have been using plastic markers for a number of years, only I get mine from a different place. I like them better than any I ever saw or used and they last and last. I even use some outside and pencil markings even last a long time. Inside

it is permanent. Johnson sells these labels now, too." Frances Anderson in Pennsylvania asked, "Want to know what I use for markers on my plants? I print the names on strips of adhesive tape with lead pencil and stick on rim of pot. Works fine."

In the Seed Propagation Robin there have been quite a few methods used for seed germination as well as soils or mixes and the results for "Ole Man" Walton proved "pretty well that vermiculite is my best medium". He went on to say "I decided against my aluminum plant markers for identification of individual pots. In their place I have painted numbers on the sides of pots with model airplane colors (yellow). This way metal markers won't get jarred out in inspection handlings nor jar the soil in pots in handling."

The Mammillaria Robin has been flying for the first time under the able direction of Harry Barwick replacing Mrs. Nathan Albert, who resigned. He is trying out a photo commentary which started a month after the robin had left him and will consist of pictures only of Mammillarias with identification and comments written on the back of the pictures. Two pictures allowed from each member. This robin covers other small plants as well in its letter section. Marion Turnock in England who has a small collection of Lithops wrote, "I had them in bowls with glazed inside and no drainage!!! They did well on the shelf nearest the glass. Then Jim and I, having seen Stone Faces planted out in a nursery, made a bed for them with porous compost, rocks and stones. They looked wonderful below eye-level for a bit. They didn't like it at all—I lost several and only flowered one this year—so back they will go into bowls and onto the top shelf." Bea Hanson in New Zealand in reply to Marion said, "Funny your Lithops weren't happy planted out as mine did quite well. In fact they are the most accommodating things for me as they just go on flowering and growing wherever I decide to plant them". Returning to Marion's letter she wants to know the secret of flowering *Mam. bombycina* and wrote, "I have two plants, one a lovely eighteen headed specimen in a six inch pot, the other a smaller plant with five pups in a three inch pot." To which Bea Hanson replied, "Golly, your *bombycina* puts my ten headed one in the shade! I have mine next to the glass but under a shelf so it doesn't get a great deal of sun but the glass house gets pretty hot. Even on a dull day the temperature goes up quite high".

From the International Robin No. 2, Julia Free in Arizona, wrote, "I had one piece of good luck. I was walking around in the desert near Phoenix and found quite a number of fasciated chollas—*Opuntia fulgida*. They are so curious they are fascinating". Ruth Sunday, in her letter from Oregon, told of the plants she had ordered from Mexico saying, "The two loveliest were *Ariocarpus fissuratus* and *A. furfuraceus*—both four inches in diameter. *A. retusus* is about seven inches in diameter and already putting out a lot of new white wool. *A. trigonus* was three inches diameter. I'd say the biggest was *A. myriostigma columnaris*—ten inches tall and has four large buds".

Doreen Murphy's letter in the Small Cacti and Mimicry Succulents Robin came from Scotland. In it she tells of a new method for rooting imported specimens explaining, "I had a bag of tufa rock sent up from Wales to use for the lime loving alpine which need very good drainage. I have used this for the *Aztekium*, *Roseocactus* and *Strombocactus* with which I have had the greatest difficulty and the result is growth and more flowers, as I have been able to give more water without rotting them". She wrote also about *Echinopsis polyantra* as "the smallest *Echinopsis*—it's a gem. The

flower is pure white and huge for the size of the plant. My plant is three years old and is in a two inch pot which it by no means fills, yet the flower is the size of a small teacup and so dainty it does not look out of proportion to the tiny plant".

The first robin to be organized, C. & S. Robin No. 1, has a suggestion from Mary Anderson in it for rooting Echeverias and it is so simple. She says, "I have decapped several of my Echeverias, have put the slips through the hole in flower pots and in just a few days the little roots appear and I have transplanted them into pots. It is the first time I have tried this and it was such a surprise".

To bring the robin news to a close here is part of the letter of one of our new members, P. G. Nichols, who lives in Arizona. He wrote, "I was sixty-nine years in July. I started my cactus garden just a year and half ago. Mrs. Nichols and I have driven at least 8,000 miles since collecting. Neither she nor I can walk much and can climb less, so most of our collecting has been what we could see while driving as slow as possible with the car on desert side roads. We find the ranchers don't mind us collecting cactus—in fact one rancher told us if I couldn't find all I wanted on this side of the road he had 3,000 acres on the other side and I could clean the cactus off it too.

"We have 1442 cactus plants plus other desert plants. My garden is well drained and I didn't give them any water from about the first of October until the latter part of March and I never lost a cactus. In fact I haven't had but six or seven go bad.

"My best day of blooms so far this year was 320. It was a beautiful sight. I get a thrill and marvel that a certain kind of cactus, regardless of where it is in my garden will have all their blooms open at the same time, almost to the minute and close the same." Mr.



FIG. 14. Crests of *Opuntia fulgida* collected by Julia Free

Nichols belongs to the Winter-Hardy Cactus Robin No. 1.

Now I wish all of you a very Happy New Year with the hope that you will feel robins are interesting and will write to me to join one. I shall do my best to place you as soon as it is possible.

(MRS.) GLADYS H. PANIS

P. O. Box 705, Falmouth, Massachusetts

THE NEW YORK CACTUS AND SUCCULENT SOCIETY

Our activities for the year 1959 were brought to a close at our Annual Meeting held on December 13th at the New York Botanical Gardens. 1959 was a year of continued growth for our society as evidenced by the year-end report submitted by our Sec'y-Treas., Mrs. Mildred H. Barad, which indicated some degree of financial solvency and also showed that our roster of paid up members had climbed to 64 during the year. The following were re-elected to office for the 1960 term:

Joseph Emma, President
Arthur Garrabrant, Vice-President
Mildred H. Barad, Sec'y-Treasurer

Re-elected to the Board of Directors were Dr. Gerald S. Barad and Walter Mansell while new additions to the Board were David Sprechman and Raymond Meier.

Following the election came our annual gift exchange to which members brought wrapped gifts and received in exchange a gift brought in by another member with all the fun and surprise of a grab-bag. And just to make sure everyone went home with more than he came with our plant sales committee made a distribution of free plants to all. Four beautiful specimen cacti and a copy of J. R. Brown's "Unusual Plants" were awarded as door prizes.

Looking back over the past year we must give due credit to our Program Committee under the able chairmanship of Rudy Arp, for arranging an outstanding series of programs which featured talks on the succulent Euphorbias, Lithops and Stapeliads, as well as

talks and workshops on Grafting and Propagation from Seed. We had one outside speaker, a representative of Lord and Burnham who delivered a most informative program on Obtaining and Setting up a Greenhouse. Also included in the programs were several color slide shows as well as monthly plant shows. No meetings were scheduled for the summer months when our customary picnics were held, the first at Dr. Barad's—which gave new members an opportunity to view his fine collection—while the second picnic took place at the Mansell farm.

The report on our participation in the 1959 International Flower Show was printed in an earlier issue so there is no need to repeat it here. We will mention that our Show Committee is at present at work preparing for our exhibits at the 1960 show where we will feature a Desert Garden. This will be the first time in many years that such a garden will be seen at the New York show and we think it will be one of the most popular exhibits at the show.

Announcements of our meetings were carried in the garden columns of every major New York newspaper due to the unflagging zeal of our one man publicity committee, Basil Shanahan. And we have received several requests from their garden editors for material to be used editorially. At the 1959 Flower Show we were approached by a gentleman who introduced himself as a writer for the State Department's "Voice of America". Of foreign birth, he had fled from the tyranny that held sway in his native land. He was most impressed, he

said, by the fact that we here in the United States could get together without interference or hindrance to form all sorts of societies and clubs, such activities being strictly forbidden in his own country. And to think that there could be a society just for fanciers of cacti! He felt this would be a strong point to be included in some future program to be beamed behind the Iron Curtain to show not only the various aspects of freedom but also to indicate that Americans are not as crassly materialistic as we are pictured in the totalitarian press.

Our society has just completed the first five years of its existence during which time we have watched it grow from a handful of members to what we believe to be one of the larger affiliates in the national society. And every one of our members is a Journal subscriber! Our meetings are well attended and it is not unusual to

find members at any meeting from three different states. We are constantly striving to provide our membership with informative as well as interesting programs and also give them a chance to purchase plants at a reasonable cost—plants that are not usually obtainable in the New York area. And when our meetings are over we all gather around the refreshment table, so ably supervised by Julia Reidel, and pass a friendly hour in conversation and good, old fashioned gossip before heading homewards. Between meetings we have instituted a series of "At Homes" so that members may get together socially and at the same time see one another's collections. We have some fine programs planned for 1960 and we look forward to a big year for the New York Cactus and Succulent Society!

JOSEPH EMMA, Affiliate Reporter



FIG. 15
Haworthia habdomadis Poelln. nat. size

Notes on Haworthias

By J. R. BROWN

Haworthia habdomadis Poelln. in Repert. Sp. Nov. XLVI (1939) 271, in Desert Plt. Life XI (1939) 88, fig.

Plant with numerous leaves in a compact rosette, about 5-6 cm. diam., stemless and simple.

Leaves broadly ovate to broadly obovate, acuminate, 2-3 cm. long, 9-14 mm. broad, smooth, greyish-green, more or less erect, incurved, semipellucid on both sides towards the tip; face of leaves lightly concave with about 6 longer and shorter darker uniting lines and terminating in a usually simple, 3-4 mm. long pellucid bristle; back of leaves rounded and with more numerous uniting darker lines, keeled in upper half, occasionally a short side keel is present near the tip, the margins and keel with up to 2 mm. long, slender pellucid teeth. Occasionally a small tooth may be found on face of leaf just below the tip.

Peduncle simple, about 25 cm. long, sterile bracts 4-6 mm. long, ovate-triangular, long acuminate with a prominent mid-nerve, pedicels 2-3 mm. long, bracts 4-5 mm. long similar to sterile bracts; perianth 14-16 mm. long, slightly narrowed at base scarcely recurved, white with greenish lines, segments recurved, lower segments more recurved than the upper, the upper mid-segment more erect.

Locality: South Africa: Cape Province; Sevenweekspoort.

The name is intended to allude to the locality, and is from the word *hebdomas*—7—something of 7 parts.

Dr. von Poellnitz compares it with *Haw. blackbeardiana* which has a toothed end-bristle 10 mm. long, to *Haw. isabellae* the older leaves of which are widely spreading with recurved

tips, to *Haw. stiemei* whose leaves have teeth 1 mm. long on the margins and a 6-9 mm. long toothed end-bristle.

This is an interesting little *Haworthia* of the sect. *Arachnoideae*, the coloring is distinctive, the lower part of leaves being a greyish-green while the upper part is brownish-green, this of course refers to plants grown outdoors. The younger leaves have thickened margins in the upper half causing the teeth to face inwards, but

as the leaves age the margins flatten and the teeth become horizontal as in other related forms.

The plant illustrated here was collected by Mr. Harry Hall at Sevenweekspoot several years ago.

The illustration of this *Haworthia* in *Desert Plant Life* l.c. is rather poor as unfortunately it is of a plant showing the effects of the long journey from South Africa, and so the leaves are described as being oblong to oblong-obovate and the older leaves erect-spreading.

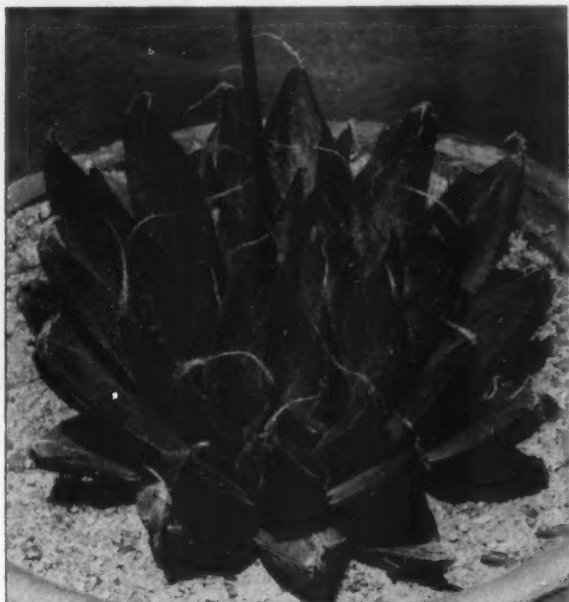


FIG. 16

Haworthia nortieri G. G. Smith nat. size
in the J. W. Dodson collection

Haworthia nortieri G. G. Smith in Journ. So. Afr. Bot. XII (1946) 13, fig. 4 & Pl. II

Plant stemless, 6.5-8 cm. diam., simple or very slowly proliferous from the base.

Leaves about 40, the younger erect, more or less incurved, the older ascending and incurved, 2.5-4 cm. long, 10-12 mm. broad above the middle, 6 mm. thick, obovate-lanceolate, acute, terminating in a 13 mm. long white, denticulate awn; face convex, more or less swollen above the middle, smooth, reddish-green in lower part brownish above, dull, irregularly pellucid in the upper half with solitary to confluent lengthwise, oblong, pellucid markings, the pellucid area about 18 mm. long, with 7 or more lengthwise brownish to green anastomosing lines, 2 or 3 of which reach the tip; back of leaf convex, smooth, light green in lower part brownish above, dull,

with solitary to confluent lengthwise pellucid markings in the upper half, and 11 or more indistinct, darker anastomosing lines which are more or less reddish near the tip; margins acute, with white pellucid teeth, slightly more than 1 mm. long at middle of leaf, becoming smaller below and above; keels 2 in upper part, the teeth same color as those on the margins but smaller.

Locality: South Africa: Cape Province; Van Rhynsdorp Distr.

Named after Dr. Nortier of Clanwilliam, Cape Province.

This *Haworthia* is distinct by the leaf markings and the color of the flowers. A photo of this *Haworthia* grown in the greenhouse of Mr. J. W. Dodson and which was taken some years ago, is of a plant growing very lushly, but shows the leaf markings very well. A plant grown out-

doors in So. California is also illustrated and probably approximates its true size. Part of an inflorescence is also shown and the dark inner segments of the lowermost flower should be noted, these inner segments are golden yellow in color except for the tips, and this color is intensified as the flower fades.

Placed in the sect. *Denticulatae*

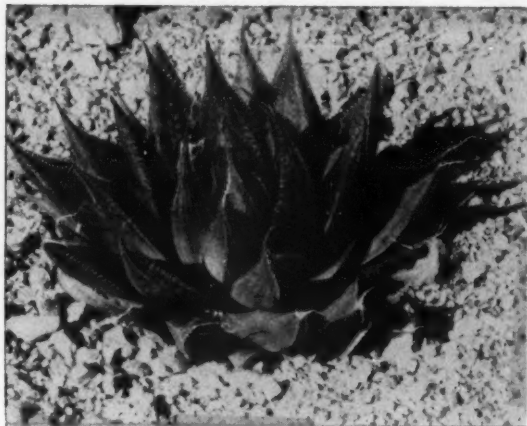


FIG. 17
Haworthia nortieri G. G. Smith nat. size



FIG. 18
Flowers of *Haworthia nortieri* nat. size

EPITAPH ? TO EOPUNTIA DOUGLASSII

By HERMAN F. BECKER
N.Y. Botanical Garden

In the 1944 October issue of the American Journal of Botany the eminent paleobotanist, Dr. Ralph W. Chaney, published a paper entitled "A Fossil Cactus from the Eocene of Utah". This first and only fossil "cactus" proved as sensational as the author's subsequent publication on the dawn redwood, *Metasequoia occidentalis* (Newberry) Chaney (1951), but in contrast to the latter, elicited together with a great deal of interest and admiration, a considerable amount of doubt and criticism. The pattern of evidence and description was developed convincingly and with great skill, in fact so much so that the uninitiated as well as many paleobotanists never doubted the validity of a reasoning presumably based on observation of the specimens and correlative, living material. Thus the new, apparently authentic cactus found its way into various American and European texts of paleobotany. At the same time seeds of doubt regarding the validity of this new genus and species remained in many minds, but they never germinated beyond the verbal stage among scientists until Dr. Roland

W. Brown, equally eminent scholar and paleobotanist of the U. S. Geological Survey, took the bull by the horns, or should we say, the cactus by the spines, proceeded to investigate once more this "unique classic", and published his interpretation under "Paleobotanical Problematica" (1959).

In 1958, Roland W. Brown found a compressed, elliptic specimen in the Green River formation of the Roan Plateau in Utah. Upon closer inspection he noted that the imprint looked "remarkably" like the segments of the purported cactus *Eopuntia douglassii* Chaney from the Green River formation in northeastern Utah. Brown states further that "for 18 years after its collection (1926) by Earl Douglass this object was an unidentified puzzle. However before and since its publication as a cactus, having drawn and handled the specimen, I have doubted that it represents a cactus and have maintained that it is rather the flattened, tuberous rootstock of some aquatic or semi-aquatic plant".

The questionable specimen consists of 3 stem

joints with one attached flower and fruit imprinted in fine textured shale. Because of "certain marked differences from *Opuntia*" a new genus, *Eopuntia*, the dawn cactus, was created and the specific epithet designated as *douglassii*. A description of stem joints, areoles, spines, vascular structure, fruit and flower is presented, but evidence for floral structures is not sufficiently complete toward a creditable reconstruction. Chaney appreciates the inherent difficulties and hazards regarding preservation, and admits to misgivings about identification as a cactus by several qualified statements. He refers to its irregular distribution of the areoles, scarcity of spines, broken flower, and the lack of sectionable internal structures. Brown goes into a detailed and plausible explanation of the so-called areoles, concluding "that the irregularity of areole arrangement and distribution alone make the Utah specimen suspect of not being an opuntia-like cactus". He continues by pointing out that these "areoles" are in fact exactly like root scars on tubers and rhizomes of certain grasses and sedges, often in multiple sets, irregularly arranged, just as in *Eopuntia*. Before publication of Chaney's paper, Brown called his attention to similarities between the proposed *Eopuntia* and Miocene specimens from Oeningen, Germany, described and figured by Oswald Heer as tuberous rootstocks of *Cyperus braunianus*, a fact which Chaney dismissed as inapplicable, assuming that the remains of these two specimens did not belong to the same species. Chaney's strongest evidence for "cactus" is the visible tissue identified as "vascular" which, according to Brown, can be matched readily with similar strands in the rootstocks of living sedges, particularly with *Cyperus rotundus* L. Disregard or misinterpretation of evidence for the tubers of sedges appears to be one of the weakest points for the case of *Eopuntia*. The zig-zag arrangement of the segments remains the only cactus-like feature, but this similarity is also found in *Cyperus* and other plants.

In spite of the vicissitudes encountered during erosion and transportation of organic material it is doubted that the tough and nearly indestructible spines of a cactus should be completely lost or "eroded" in the process. Furthermore, the purported "bud" and "flower" is shown by Brown to have been a segment like those to which they are attached. It is difficult to conceive that, first, if most of the surface of the segments was "heavily eroded", they should have remained attached during the process of transportation, and that, secondly, the tender and usually brittle buds and flowers which break off readily on any cactus, should have remained attached and recognizable as such floral structures. Considering, moreover, that vegetative and reproductive struc-

tures on one specimen are extremely rare in the fossil record, it seems an incredible coincidence that the only "cactus" ever discovered in the fossil record should have been of such a nature.

Appreciating the eminent qualifications of both paleobotanists, Chaney and Brown, the weight of evidence seems to scale for *Cyperus* rather than *Eopuntia*. During the past 150 years not a trace of any other fossil cactus, dissociated spines or structures relating to cactus, including pollen, were ever found; but many tuber-like structures relating to sedges are extant. These facts in themselves are suggestive in favor of *Cyperus*.

In his search for specimens similar to the purported *Eopuntia*, Brown synonymizes *Diatryma*? *filifera* Cockerell (excluding fig. A), *Carpolithus filiferus* Brown, and *Eopuntia douglassii* Chaney, and combines them under *Cyperus filiferus* (Cockerell) Brown. Brown, in his refutation of *Eopuntia*, cited 6 references, while Chaney, going farther afield into peripheral floristic, climatic, and ecological evidence, cited 27 references.

It is to be hoped that additional specimens of identical nature will reveal sufficient diagnostic detail to clear up and bring to a conclusion the case of *Eopuntia* versus *Cyperus*.

REFERENCES

- Brown, Roland W. 1959. Some paleobotanical problems: Jour. Paleontol., vol. 33, No. 1, p. 122-124, pl. 23, fig. 3.
 Chaney, Ralph W. 1944. A fossil cactus from the Eocene of Utah: Am. Jour. Bot., vol. 31, p. 507-528, pl. 1-5, figs. 1-6.

EDITOR'S NOTE: Photos and a discussion of this proposed fossil appeared in this Journal, Vol. XXII, No. 1, January 1950.

NEW BOOKS

- Mexico's Diamond in the Rough—Timberman \$4.95
 Sedum of the Trans-Mexican Volcanic Belt
 An Exposition of Taxonomic Methods—Clausen ?
 Illustrated Reference on Cacti and Other Succulents
 —Lamb. Vol. II 6.85
 Backeberg's Monograph (in German) Vol. III 21.85
 Succulent Plants—Bertrand (English) 2.85

New 1960 Book List now available

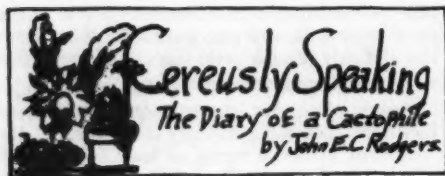
Please add Sales Tax on deliveries in California

FLOWERING SUCCULENTS—Rowley (England)

An excellent 80-page book for the amateur. How they are named, cultivation, propagation, indoor culture with answers as to why they do not flower, glass-house and garden methods. Reading list and glossary of terms. Nine pages of color and many other illustrations make this a most fascinating book on both cacti and the other succulents. \$1.35 postpaid.

ABBEE GARDEN PRESS

132 W. UNION ST., PASADENA, CALIF.



A mild fall with dire predictions by amateur weather forecasters was our lot here on the banks of good old Lake Erie. It stored up heat all summer with a 74° reading in late summer. It is now 39° as of December 25. We did have a cold spell on November 16 and 17 which would have "cooked" everything but I had already stored my plants as of November 2nd. They were without heat until November 17. I started fire when the temperature dropped to 16°, next day it was 10°. Since then it has gotten back to the 30's and 50's.

Last year I left my Chamaecereus out until snow. I tried it this year with duplicates. 10° was too low for them when on roots but unrooted pieces survived without damage. The rest are a total loss.

My greenhouse is crowded to capacity even after I traded duplicates for rocks, emptied out failures, and gave away offsets to school children. I'm always trying something new and I find that orchid culture methods have proved excellent for slow growing Rhipsalis as well as for Epiphyllums. Shredded willow or cedar bark mixed with coarse sand gives the spurt incentive that the plants need. These being epiphytic, send roots out over the surface of the soil and over the edge of the pots. Rhipsalis stay healthy with little repotting over a period of years. However, when I see stems browning at the edges, turning yellow, or falling off, I know that the plant needs repotting. With shredded bark or porous leafmold soil, the plants soon show healthy, vigorous growth.

I have correspondents who write long letters about their rain water routines to avoid lime, fluorine, etc. in the local water supply. I have visited some collections and as far as I can see they have the same ills as I do. There are no easy, fool-proof short cuts in succulent culture, I've found. Of course I use less lime in all my soils than I did at first because I have found out that water treatment systems around here do not remove the lime, so my plants get it from the water. When I think there is an excess in the soil from watering, I give a heavy vinegar watering which leaches out the lime and leaves the soil slightly acid for such plants as normally like humus types of soils. Lime won't hurt the others.

I steer clear of any ritual which means a wholesale upsetting of plants such as yearly repotting, tapping out the soil to examine for root meales, swigs of vitamins, and feeding for blooms since I feel a plant blooms if it has proper soil.

My idea of a greenhouse or garden has always been one of sheer enjoyment. I'm never harassed by the feeling of work, work, and more work. I divide my time inso pleasure-inspection and work-inspection. No, I do not allow weeds to grow in the soil about my plants—not even behind long spined Ferocactus. Cactophiles who visit western collections frequently come back and let the weeds grow, saying they absorb excess moisture. I do not over-water, therefore I do not need weeds to absorb water or even to supply shade as our sun is benevolent here.

I do allow cuttings or broken off pieces to lay on the soil surfaces to callus and take root. This is very effective for hard to root Christmas Cactus, Hawor-

thias, Stapeliads, etc. These supply me with trading stock and for gifts.

In going over my experiences with cacti and other succulents, I'm amazed at my constancy in loving the plants and finding such congenial fellow travelers. I began collecting over 30 years ago and although I do not have the original plants, I do have cuttings (some cuttings of cuttings, etc.).

When I began subscribing to the Cactus Journal in 1936 I had been struggling along with a few books from England, magazine and newspaper articles. In 1932 I heard about Eugene Ziegler, Spencerport, N. Y., who showed me the Britton and Rose reprints appearing in the Journal and the plan for reprinting them in book form. These few pages each month were like throwing crumbs to the birds so Mr. Ziegler suggested advance orders for the four volumes and enough were obtained so that the reprinting in book form was completed by 1937. Now it's a far cry from the meager literature that I had in the 1930's. Now I own shelves full, stacked, stored and thoroughly at loose ends. I need to classify and index the material to make it more usable. My diary began in January 1934 and in it I listed the purchases. From Mr. Ziegler's books and magazine I found that cactus collecting waxes and wanes every 25 to 30 years since they were first introduced by the explorers of Americas and the adjacent islands.

Now, thanks to the Cactus Journal, literature is available from the four corners of the earth. Interest is also kept alive by seedlings of rarities advertised in the Journal and numerous catalogs of dedicated growers and dealers. Is there a waning of interest in cacti and the other succulents? Yes, I think so because us oldsters fail to sell our hobby to the younger generation. We are losing local club members to Florida, Arizona, and other warmer regions because of age. The editor of the Journal reports the largest circulation in 31 years of publication, so there must be other groups or scattered individuals who are coming along to take our places. The Journal has helped me, not just because I write for it, but it keeps my hobby before the public and is recognized by scientific institutions and acts as a clearing house for both amateur and student.

This February marks the 18th year of "Cereusly Speaking" with holiday greetings from all over the world besides 22 states. Thank all of you for your best wishes. Thanks to Scott Haselton for transcribing my hieroglyphics as he calls my penmanship. Please remember that this column is not a panacea for anything, not even a guide. Just a chat with my friends telling you about my hobby and its absorbing variety of successes, failures, joys, sorrows. When speaking to garden groups I frequently see a fine grown succulent among other plants and I always feel constrained to tell them this is one of the plants I have been talking about. I'm afraid they will begin to treat it like a freak and lose it.

Basic facts with infinite variation are possible in any type of gardening. Soils vary in content even in the same area but it is essential that they must be porous and well drained and open to the air. Leggy plants are usually due to too little light and too much water and heat. They couldn't survive outside even in summer away from the shelter of the house. Diseases and bugs come from poor growing conditions also. A well ventilated and correctly lighted house, properly watered and well drained soil, and not too high a temperature, insures disease and bug resistance. And above all, patience is the best virtue of any gardener.

JOHN E. C. RODGERS
1229 W. 8 St.
Lorain, Ohio



SPINE CHATS

LADISLAUS CUTAK



Last year, all my chatter was concerned with the cactus convention and now, that this event has passed, I'll be able to resume my routine gossip on various subjects. First of all, with winter at our heels, we shall be attempting to catch up on our belated reading. Many new cactus and succulent books have been published during 1959 and there is nothing so satisfying as a good book to supplement our search for continuing a successful hobby.

Those of you who love to grow plants from seed will be interested in a 64-page hardcover booklet published this year by the Blandford Press of London (\$1.25 Abbey Garden Press). The title of the book is *CACTI FROM SEED* and the author is Edgar Lamb, who also puts out the wonderful "Illustrated Reference on Cacti and other Succulents." The title of the book is somewhat misleading as not only cacti but other succulents are equally featured. Some of the illustrations have not reproduced too well and could have been omitted; however, the text is very excellent and easy to understand. The latter is the important thing. I can heartily recommend Mr. Lamb's technique because I have been growing cacti from seed for many years. His lucid instructions are pointed chiefly to the beginner rather than the expert. The beginner will be greatly aided in growing succulents from seed—the easy way!

If you have been reading the British Cactus Journals in the past I'm sure you have become acquainted with Gordon Rowley and his enlightening articles on plants, their naming and history. This young fellow, who is on the staff of the John Innes Horticultural Institution, is quite a busy man doing research and has always been interested in a succulent collection.

FLOWERING SUCCULENTS—the first of a series of inexpensive but beautifully-produced books dealing authoritatively with a variety of subjects of unusual interest—is, as far as I know, Rowley's first book and a very good one. It was published by Living Colour Publications of Farnham, England, earlier this year. There are only 80 pages of text, but a variety of subjects are covered, botanical terms explained, cultural hints given, a number of fallacies exposed, and suggestions for maximum enjoyment of the

hobby proposed. There are a number of line drawings, black & white photographs, and several color plates which all add up for another splendid book for your attention (\$1.50 Abbey Garden Press).

At the last convention, Charlie and Mildred Cole of Cincinnati presented me with an adventure book, *MEXICO'S DIAMOND IN THE ROUGH*, which was written by Mildred's brother, O. W. Timberman, a retired oil executive from Tucson. The book was published by Westernlore Press in 1959 and is a happy recounting of the Timbermans' observations and adventures in Baja California—that fabulous land which most cactus lovers would like to visit. Timberman's book is not really a cactus book although it is sprinkled with vernacular names of these plants, but anyone contemplating a visit to that region will derive much information on the people, places and travel problems to be encountered. (Abbey Garden Press \$4.95)

Cephalocleistocactus is a new genus in the *Cactaceae* published by F. Ritter in the August 1959 number of *SUCCULENTA*, the Dutch Cactus Journal. The type species, *C. chrysocephalus* comes from Bolivia and is the only known species at present. This cactus produces slender branches, each characterized by 11 to 14 low ribs and small closely set areoles from which 15 radials and 6 central spines emanate. The cephalium is at least a meter long conspicuous with yellow to brown hairlike spines. The flowers are reddish, suberect and up to 5 cm. long.

MISSOURI BOTANICAL GARDEN

Shaw's Garden is beginning its second century with a centennial year of expansion and redevelopment. Among Lad Cutak's new duties will be the superintending the planting of the new "Climatron" which is a dome-shaped structure 175 feet in diameter, rising over 70 feet at the center without a single interior support. We suggest that this air-conditioned and moisture-controlled display greenhouse be filled with cacti! The multiple climates within this shadowless structure will care for a variety of tropical and semi-tropical displays.

The June issue of Missouri Botanical Garden Bulletin, Vol. XLVII, Number 4, is devoted to succulent plants and is written by Lad, in his spare time! This is similar to his "Growing and Enjoying Succulents" with the addition of Plant Families which have Succulent Members. Many examples are given for each family and is an excellent birds-eye-view of the subject.

COLLECTIONS OF MEXICAN CACTI

Send for prices
Satisfaction guaranteed
LA QUINTA—F. SCHMOLL
 Cadereyta des Montes, Qro., Mexico

CACTUS AND SUCCULENTS

Dish Garden assortments, exotic, native and imported Mexico plants. Haworthias our specialty. Wholesale and Retail.

WALKER'S CACTUS GARDENS
 (Formerly Pirtle's)
 Rt. 1, Box 558, Edinburg, Texas

In answer to many recent inquiries I wish to inform those interested that I publish no plant or seed lists. No retail sales. All plants are sold at the nursery. I make no shipments or deliveries.

Visitors by appointment. No phone.

R. H. DIEHL
 Route 4, Box 3034, Vista, Calif.

THE U.C. SOIL MIX

RECOMMENDED by the International Succulent Institute and used for growing their own plants. Widely used by botanical gardens and commercial growers.

TESTED—Many thousands of succulent plants have been successfully grown in this mix, with better results than with any other soil.

INEXPENSIVE—Just compare the cost: A cubic foot (8 gallons) may be prepared for as little as \$1.25.

SIMPLE—Only three ingredients: Sand, Peat and I.S.I. Minerals.

STORAGE—May be stored indefinitely.

DEPENDABLE—No variation, always the same.

CLEAN—No messy or smelly ingredients.

STERILE—Free of weed-seeds, insects and pathogens.

EASY TO USE—Just try it and see.

GUARANTEED—Use one package of I.S.I. Minerals as recommended. If not completely satisfied, return the label and we will gladly refund the cost of the minerals.

PREPARATION—One package (12 ozs.) of I.S.I. Minerals is sufficient for 16 gallons of U.C. Soil Mix. Complete instructions and a sample of correct sand are included with the order.

12 Oz. package I.S.I. Minerals I-B and sample of sand, for growing cacti, other succulents, and most house plants, prepaid\$1.40

12 Oz. package I.S.I. Minerals II-B and sample of sand, for growing African Violets, Epiphytic Cacti, Fuchsias, etc., prepaid\$1.40

INTERNATIONAL SUCCULENT INSTITUTE, INC.

921 Murchison Dr., Millbrae, California

**ORCHID CACTUS (EPIPHYLLUMS)**

22nd Annual Show—April 1 to June 30

Hundreds of varieties. Visit our Jungle Gardens. Colored pictures shown to Garden Clubs. Send 35¢ for 32-page Picture Book and price list.

THE CACTUS PETES

5454 Valley Blvd.

Los Angeles 32, Calif.

WANTED TO BUY

Cactus seed by the pound.

THE CACTUS GARDEN

Rt. 3, Box 44

Edinburg, Texas

CACTUS SEED

from Friedrich Ritter's expeditions through South America. Comprising many beautiful, rare and new species of: Arequipa, Browningia, Cephalocleistocactus, Cleistocactus, Copiapoa, Corryocactus, Espostoa (mirabilis, ruficeps, superba), Eulychnia, Haageocereus, Horridocactus, Islaya, Matucana, Morawetzia, Oroya, Parodia, Rodentiophila, Soehrensia, Trixanthocereus, etc.

Descriptive and illustrated catalog sent on request.

H. WINTER

Frankfurt/M.—Fechenheim, Germany

Supplier of cactus seed for more than 30 years.

Purveyor to botanical gardens at home and abroad.

WANTED COUPLE

Middle age. Interested in propagating cacti and succulents on estate for free rent and salary. La Habra Heights, California

Phone OW 7-2076

Back in the mail-order business with a nice assortment of rare Mexican Cacti. Write for free price list.

LAWSON CACTUS GARDENS

1223 S. Alamo St.

San Antonio, Texas

FREE FOR THE ASKING!

Illustrated price list of over 200 varieties of finest nursery grown plants, including seedlings from Africa, Mexico, and other parts of the world. Some specimen imports.

JUDY'S CACTUS GARDEN

Dept. C5, Rt. 2, Box 216-A, Fallbrook, Calif.

SAMPLE COPIES WANTED

Newsletters, bulletins, magazines and other publications of local, state or regional cactus clubs. Stamps for cost of publication and postage will be sent upon receipt. Mail to Edgar P. Sherman, 1251 Eudora St., Denver 20, Colorado.

CACTI FOR SALE

Many show plants, crests and grafts
 Sundays only

C. REDLER

8913 Ashcroft, West Hollywood, CR 1-6681

FOR SALE

Britton and Rose "The Cactaceae" original edition with color-plates. Excellent condition. Lloyd Miller, 313 Panorama Dr., Bakersfield, Calif.



